Fl*5:24

R39898

MANUAL OF GYNECOLOGY.

MANUAL

OF

GYNECOLOGY.

BY

D. BERRY HART, M.D., F.R.C.P.E.,
LECTURER ON MIDWIFERY AND DISEASES OF WOMEN, SCHOOL OF MEDICINE, EDINBURGH;
LATE ASSISTANT TO THE PROFESSOR OF MIDWIFERY, UNIVERSITY OF EDINBURGH;
LATE PRESIDENT OF THE ROYAL MEDICAL SOCIETY, ETC.:

AND

A. H. BARBOUR, M.A., B.Sc., M.B.,
ASSISTANT TO THE PROFESSOR OF MIDWIFERY, UNIVERSITY OF EDINBURGH;
LATE PRESIDENT OF THE ROYAL MEDICAL SOCIETY.

ROYAL COLLEGE OF PHYSICIANS, EDIN^R.
LIBRARY

WITH NINE LITHOGRAPHS AND FOUR HUNDRED WOODCUTS.

EDINBURGH:
MACLACHLAN & STEWART.
LONDON: SIMPKIN, MARSHALL & CO.
1882.

TO

OUR FRIEND AND TEACHER,

ALEXANDER RUSSELL SIMPSON,

M.D., F.R.S.E.,

PROFESSOR OF MIDWIFERY AND DISEASES OF WOMEN AND CHILDREN IN THE
UNIVERSITY OF EDINBURGH.

PREFACE.

IN writing this Manual we have tried to keep before our eyes the great principle that the Anatomy, Physiology and Pathology of the Pelvic Organs form the foundation of good Clinical work. As students we felt the want of a text-book based on this principle and embodying the most recent views from the various literatures instead of giving those of one school. This want we have endeavoured to supply.

Our thanks are due to Professor Simpson for his kind advice in matters of difficulty: and specially to Mr J. A. Melville, for the literary revision of the text and the preparation of the copious Table of Contents and Indexes.

Messrs W. & A. K. Johnston have executed the lithographs with their well-known accuracy and finish: and to Mr James Bayne we are indebted for the care and fidelity with which he has drawn on the wood the majority of the engravings. We have in all cases acknowledged the source of every illustration not specially prepared for this work.

D. B. HART.
A. H. BARBOUR.

EDINBURGH, *July* 1882.

TABLE OF CONTENTS.

PART I.

ANATOMY, PHYSIOLOGY, AND METHODS OF EXAMINATION OF THE FEMALE PELVIC ORGANS.

SECTION I. ANATOMY AND PHYSIOLOGY OF THE FEMALE PELVIC ORGANS.

PAGE

CHAP. I. General Anatomy of External Genitals and Contents of Pelvis 2
- External Genitals as observed Clinically . . 3
- The Pelvic Floor and Organs resting on it, considered as a whole 7
- The Pelvis considered in detail . . . 8
    - Musculature of the Pelvic Floor . . 8
    - The Uterus and its Annexa . . . 12
    - Fallopian Tubes 20
    - Ovaries 22
    - Vagina 24
    - Bladder 27
    - Rectum 35
    - Perineal Body 36
    - Peritoneum 37
    - Connective Tissue of Pelvis . . . 40

CHAP. II. The Position of the Uterus and its Annexa, and the Relation of the Superjacent Viscera . . . 46
- The Normal Form and Position of the Uterus . 48
- The Local Divisions of the Pelvic-floor Peritoneum as viewed through the Pelvic Brim, and the position of the Uterine Annexa . . . 51
- The Physiological Changes in the position of the Uterus 52
- The Relation of the Small Intestine to the Pelvic Floor and to the Uterus with its Annexa . 54

PAGE

CHAP. III. Structural Anatomy of the Female Pelvic Floor . . 55
- Pubic Segment 56
- Sacral Segment 56

Pelvic Floor Projection 60

CHAP. IV. Bloodvessels of the Pelvis 64
- Arterial Supply 64
  - to Uterus, Ovaries, &c. . . . 64
  - to Perineal Region 65
- Venous Distribution 65

Lymphatics of the Pelvis 67
- Lymphatic Glands 67
- Lymphatic Vessels 67
  - of External Genitals . . . 67
  - of Vagina and Cervix Uteri . . 68
  - of Uterus 68

Nerves of the Pelvis 69
- Spinal 69
- Sympathetic 69

Development of Pelvic Organs 69

CHAP. V. Physics of the Abdomen and Pelvis, with special reference to the Semiprone and Genupectoral Postures . 71
- The effect of Intra-abdominal Pressure on the Female Pelvic Floor 71
- Results brought about by change of Posture, especially by the Genupectoral Posture . . 72
- The effect on Uterine position of Digital Pressure in the Vaginal Fornices 77
- Relation of Posture to Examination and Treatment 78

CHAP. VI. Menstruation and Ovulation 79
- Preliminary Considerations 79
- General Phenomena 80
- Local Phenomena 80
- Ovulation 80
- Corpus Luteum 81
- Source of Discharge 82
- Changes in the Uterine Mucous Membrane . 82

SECTION II. PHYSICAL EXAMINATION OF THE FEMALE PELVIC ORGANS.

CHAP. VII. External Abdominal Examination 88

Inspection of External Genitals 91

Vaginal Examination 91

Bimanual or Abdomino-Vaginal Examination . . 93

Other Methods of Abdominal Examination . . 97

CHAP. VIII. Examination per Rectum 98
- Simple Rectal 98
- Abdomino-Rectal and Abdomino-Recto-Vaginal . 100
- Simon's Method of passing the Hand into the Rectum 100

PAGE
CHAP. IX. The Volsella 101
Description of Instrument 101
Methods of Use 101
Mechanism of Displacement it causes . . 103
Uses in Diagnosis 104
in Treatment 105
Contra-indications 105

CHAP. X. Vaginal Specula 106
Spatular Speculum—the Sims . . . 106
Tubular Speculum—the Fergusson . . . 109
Bivalve Speculum—the Neugebauer . . 110
—the Cusco . . . 112
Uses and comparative value of the various Specula 112

CHAP. XI. The Uterine Sound 113
Nature 113
Preliminaries to its use; when not to use it . 114
Method of use 115
Employment of the Sound for Diagnosis . . 119
,, ,, Treatment . . 120
Dangers attending its use 120
Sound combined with Bimanual . . . 121
Relation of Sound to Bimanual and Rectal Examination 122

CHAP. XII. Means of Dilating the Cervical Canal . . . 123
Tents 123
Material 123
Purposes for which used . . . 124
Preliminaries to and method of use . . 126
Dangers in use and contra-indications . 128
Hard Rubber Dilators—Tait's, Hank's . . 128

CHAP. XIII. The Curette 130
Varieties 131
Cases in which useful 131
Method of use 131
Cautions and dangers 132

CHAP. XIV. Instruments 133
Knives 133
Scissors 133
Needles 134
Sutures 135
Antiseptics 135
Vaginal Syringes and Douches . . . 136
Cautery 138
Anæsthetics 140
Action of Chloroform . . . 140
Uses of Chloroform 141
Method of administration . . . 141
Dangers 143

PART II.

DISEASES OF THE FEMALE PELVIC ORGANS.

SECTION III. THE PERITONEUM AND CONNECTIVE TISSUE.

PAGE
CHAP. XV. Pelvic Peritonitis 149
Pathological Anatomy and Varieties . . 149
Etiology 150
Symptoms and Physical Signs . . . 152
Differential Diagnosis 153
Course and Results 153
Prognosis 153
Treatment 153
Prophylactic 154
General 154
Local 156
Pelvic Cellulitis 157
Pathological Anatomy and Varieties . . 157
Etiology 158
Symptoms 159
Physical Signs 159
Differential Diagnosis between Pelvic Peritonitis and Cellulitis 160
Course and Results 161
Prognosis 161
Treatment 161
CHAP. XVI. Pelvic Hæmatocele 163
Nature 164
Pathological Anatomy 164
Etiology : Sources of Hæmorrhage and Varieties . 166
Symptoms 167
Physical Signs 168
Diagnosis and Differential Diagnosis . . 170
Course and Results 170
Prognosis 170
Treatment 170
At onset of Hæmorrhage . . . 170
After Suppuration has occurred . . 170

SECTION IV. AFFECTIONS OF THE FALLOPIAN TUBES AND OVARIES.

CHAP. XVII. Fallopian Tube 174
Abnormalities 175
Stricture of the Tubes 175
Patulous Condition of the Tubes . . . 175
Inflammatory Condition of the Tube—Catarrhal Salpingitis 176

PAGE

CHAP. XVII. Fallopian Tube—*continued.*
Hydrops Tubæ 177
Pyosalpinx 177
Hæmatosalpinx 177
Neoplasms 178
Parovarium 178
Round Ligament 178
Hydrocele 178
Broad Ligament 179
Tubo-Ovarian Cysts 179

CHAP. XVIII. Malformations of Ovary 180
Ovaritis and Periovaritis 181
Pathological Anatomy 181
Etiology 181
Symptoms and Physical Signs . . . 182
Differential Diagnosis 182
Progress and Results 182
Treatment 182
Periovaritis 183
Displacements of the Ovary—Hernia . . . 183
Etiology 183
Treatment 183
Prolapsus 184
Pathological Anatomy 184
Etiology 184
Symptoms 184
Physical Signs 184
Treatment 185

CHAP. XIX. Battey's Operation 187
History of Operation 187
Nomenclature 187
Nature and Aims of Operation . . . 188
Indications for Operation 188
Method of performing the Operation . . 190
Vaginal Method 190
Abdominal Section 190

CHAP. XX. Pathology of Ovarian Tumours 194
Mode of Origin of Ovarian Cysts . . . 194
Varieties of Ovarian Tumour . . . 198
Naked-eye Anatomy 198
Microscopic Anatomy . . . 199
Nature of Ovarian Fluid 199
of Parovarian Fluid 201
Solid Ovarian Tumours 201
Malignant 201
Non-Malignant 201

CHAP. XXI. Diagnosis of Ovarian Tumours 203
When Small and Pelvic in position . . . 203
Lateral to Uterus 203
Posterior to Uterus 204

PAGE
CHAP. XXI. Diagnosis of Ovarian Tumours—*continued.*
When large, and chiefly Abdominal in position . . . 205
Symptoms 205
Physical Signs 205
Differential Diagnosis 207
Diagnosis of Adhesions 209
Co-existence of Pregnancy and Ovarian Tumour . . . 209

CHAP. XXII. Operative Treatment of Ovarian Tumours . . . 210
Ovariotomy 211
Vaginal method 211
Abdominal method 211
Requisites 212
Preliminaries 214
The Incision 214
Evacuation of Cyst 214
Drawing out of the Cyst from Abdomen . . . 215
Separation at the Pedicle 215
Treatment of Adhesions and Bleeding . . . 218
Toilette of the Peritoneum 218
Closure of Wound 219
Drainage 219
Dressing of Wound 219
After-Treatment : Treatment of Complications 219
Relation of Listerism to Ovariotomy . . . 220
Ovariotomy by Enucleation 220
Ovariotomy when Pregnancy is present . . . 221
Contra-indications to Ovariotomy 221
Course and result of Ovarian Tumours when left alone 221
Adhesions 221
Torsion of Pedicle 221

SECTION V. DISEASES OF THE UTERUS.

CHAP. XXIII. Malformations of the Uterus 225
Pathology 226
Etiology and Classification 230
Symptoms 231
Diagnosis 232
Prognosis 235
Treatment 235

CHAP. XXIV. Atresia of the Cervix Uteri 236
Etiology and Pathology 236
Stenosis of the Cervix 237
Pathology 237
Etiology 237
Symptoms 238
Diagnosis 239
Prognosis 239
Treatment 240
Dilatation 240
Division 240

PAGE

CHAP. XXV. Atrophy of the Cervix and Uterus . . . 245
Superinvolution of the Uterus 246
Pathology 246
Etiology 246
Symptoms 246
Diagnosis 246
Treatment 248

CHAP. XXVI. Hypertrophy of the Cervix—Vaginal portion . 250
Pathology 250
Etiology 251
Symptoms 251
Diagnosis 252
Treatment—Amputation 252
With Scissors or Knife . . . 252
With Ecraseur or Cautery . . . 257
Hypertrophy of the Cervix—Supra-vaginal portion 257
Treatment 259

CHAP. XXVII. Laceration of the Cervix 262
Pathology 263
Etiology 265
Symptoms 265
Diagnosis 266
Treatment 267
Emmet's Operation 268

CHAP. XXVIII. Chronic Cervical Catarrh 273
Pathology 273
Etiology 278
Symptoms 278
Physical Signs 279
Diagnosis and Differential Diagnosis . . 280
Prognosis 281
Treatment 281

CHAP. XXIX. Endometritis 285
Pathology 285
Etiology 289
Symptoms of Acute Endometritis . . . 290
of Chronic Endometritis . . . 290
Physical Signs of Acute Endometritis . . 291
of Chronic Endometritis . . 292
Diagnosis, Differential Diagnosis . . . 292
Prognosis 293
Treatment of Acute Endometritis . . . 293
of Chronic Endometritis . . 294

CHAP. XXX. Acute Metritis 299
Pathology 299
Etiology 299
Symptoms 300
Physical Signs 300
Progress and Termination 300

CHAP. XXX. Acute Metritis—*continued.* PAGE
Diagnosis 301
Prognosis 301
Treatment 301
Chronic Metritis 301
Pathology 302
Etiology 304
Symptoms 305
Physical Signs, Diagnosis 306
Differential Diagnosis 307
Treatment 307
CHAP. XXXI. Displacements of the Uterus 310
Anteflexion 315
Pathology 315
Etiology 318
Symptoms 319
Diagnosis 321
Differential Diagnosis . . . 322
Prognosis 323
Treatment 323
Anteversion 328
Pathology 328
Etiology 328
Symptoms 328
Diagnosis 329
Treatment 329
Retroversion 332
Pathology and Etiology . . . 332
Symptoms 333
Diagnosis 333
Treatment 334
Retroflexion = Retroversion + Retroflexion . 334
Pathology 334
Etiology 337
Symptoms 337
Diagnosis 339
Differential Diagnosis . . . 341
Prognosis 342
Treatment 342
Replacement by Bimanual . . 343
with the Sound . . 344
by Genupectoral Posture 346
Retaining the replaced Uterus by Pessaries 347
CHAP. XXXII. Inversion of the Uterus 354
Pathology 355
Etiology and Frequency 359
Symptoms 360
Diagnosis 361
Differential Diagnosis 363
Course and results of Chronic Inversion . . 364
Prognosis 365
Treatment 365
Reposition 365
Amputation 371

PAGE
Chap. XXXIII. Fibroid Tumours of the Uterus 373
Pathology 373
  Situation 373
  Structure 374
  Mode of Growth, Varieties 376
  Changes in the Uterus 379
  Degenerative Changes 381
  Fibroid Tumours of the Cervix 382
Etiology 383
Chap. XXXIV. Fibroid Tumours of the Uterus—(*continued*) 385
Symptoms 385
  Menorrhagia, Irregular Hæmorrhages 385
  Painful Menstruation 386
  Sensations due to size and weight of Tumour 387
  Pressure Symptoms 387
Progress and results 388
Physical Signs: Differential Diagnosis 389
  Of small Fibroid Tumours 389
  Of large Fibroid Tumours 391
Prognosis 394
Chap. XXXV. Fibroid Tumours of the Uterus—(*continued*) 395
Medical Treatment 395
Surgical Treatment 397
  Removal through the Vagina 397
  Removal through Abdominal Walls by Laparotomy 401
Chap. XXXVI. Fibro-Cystic Tumour of the Uterus 409
  Pathology 409
  Symptoms 411
  Diagnosis; Differential Diagnosis 411
  Treatment 411
Chap. XXXVII. Polypi of the Uterus 412
  Varieties 412
  Symptoms 417
  Diagnosis 418
  Differential Diagnosis 420
  Prognosis 422
  Treatment 422
Chap. XXXVIII. Carcinoma Uteri (of Cervix) 424
Pathology 424
  Classification 425
  Origin 427
  Position 427
  Progress 428
  Extension to neighbouring Organs 429
Etiology 432
  General predisposing Causes 432
  Local predisposing Causes 434

PAGE
CHAP. XXXIX. Carcinoma Uteri (of Cervix)—(*continued*) 436
- Symptoms 436
  - Local Symptoms 436
    - Hæmorrhage 436
    - Offensive discharge 437
    - Pain 437
  - General Symptoms 438
- Diagnosis 439
  - Differential Diagnosis 440
- Prognosis 442
  - Causes of death 443

CHAP. XL. Carcinoma Uteri (of Cervix)—(*continued*) 446
- Treatment of Symptoms 447
  - Hæmorrhage 447
  - Offensive discharge 447
  - Pain 448
- Treatment of the Disease 448
  - Application of Caustics 450
  - Scraping out of diseased tissue 451
  - Amputation of the Cervix 451
    - Ecraseur or Galvano-cautery 451
    - Knife and Scissors, with Ligature or Caustics 456
  - Excision of the whole Uterus 459
    - By Abdominal Excision (Freund's method) 459
    - Through the Vagina 462

CHAP. XLI. Carcinoma of the Body of the Uterus 464
- Pathology and Etiology 464
- Symptoms and Diagnosis 465
- Treatment 466

CHAP. XLII. Sarcoma Uteri 467
- Pathology 467
- Etiology and Frequency 471
- Symptoms 471
- Diagnosis 472
- Prognosis 473
- Treatment 474

SECTION VI. AFFECTIONS OF THE VAGINA.

CHAP. XLIII. Atresia Vaginæ 477
- Pathology 476
  - Atresia Hymenalis 476
  - Atresia Vaginalis 477
- Etiology 479
- Symptoms 480
- Diagnosis 480
- Prognosis 482
- Treatment 483
  - Operation for Imperforate Hymen 483
  - for Atresia Vaginæ 484
  - for Atresia of the Cervix 486
- Atresia of one half of a Septate Uterus and Vagina 487

PAGE
CHAP. XLIV. Vaginitis 489
Nature and Varieties 489
Pathology 489
Etiology 491
Symptoms 492
Diagnosis 492
Treatment 493
Vaginismus 494
Etiology 494
Symptoms and Diagnosis 494
Treatment 495
Sims' Operation 495
Tumours of the Vagina 496
Cysts 496
Fibroid Tumours 497
Carcinoma 498
Sarcoma 499

SECTION VII. AFFECTIONS OF THE VULVA AND PELVIC FLOOR.

CHAP. XLV. The Vulva: Malformations 505
Hermaphroditism 506
True 504
False 504
Inflammation of the Vulva 505
Pruritus Vulvæ 506
Eruptions on the Vulva 508
Tumours of the Vulva 509
CHAP. XLVI. Rupture of the Perineum 512
Nomenclature 512
Pathology and Varieties 513
Etiology 513
Treatment 514
Prophylactic 515
Operative—immediate . . . 515
deferred 516
CHAP. XLVII. Displacements of the Pelvic Floor: Prolapsus Uteri 521
Structural and Anatomical Preliminaries . . 521
Symptoms and Physical Signs . . . 522
Mechanism 522
Diagnosis and Differential Diagnosis . . 524
Etiology 524
Nature 524
Treatment, by Pessaries 526
Treatment, by Operation 527
Repair of Perineum 529
Repair of Perineum and Paring of Posterior Vaginal Wall 529
Making Raw Surface on Anterior Vaginal Wall 531
Making Raw Surface on both Walls, etc. . 531
Vaginal Enterocele 532
Treatment 533

SECTION VIII. DISTURBANCES OF MENSTRUAL FUNCTION.

PAGE
CHAP. XLVIII. Amenorrhœa 536
Local Causes 536
Constitutional Causes 536
Menorrhagia 537
Dysmenorrhœa 538
Varieties 539
Treatment 540

SECTION IX. DISTURBANCES OF REPRODUCTIVE FUNCTION.

CHAP. XLIX. Sterility 543
Abortion 544
Retroflexion of the Gravid Uterus . . . 546
CHAP. L. Extra-uterine Gestation 548
Pathology 548
Etiology 551
Symptoms and Diagnosis 552
Progress and Termination 554
Treatment 554
Case of 555

SECTION X. AFFECTIONS OF BLADDER AND RECTUM.

CHAP. LI. The Bladder 560
Anatomy and Physiology 560
Exploration by Catheter and Sound . . 562
Finger and Speculum . . 563
Catheterisation of Ureter . . 566
CHAP. LII. Affections of the Urethra 567
Neoplasms; Urethral Caruncle . . . 567
Urethritis 568
Dilatation and Stricture 569
Diseases of the Bladder 569
Displacements 569
Cystocele 570
Neoplasms 570
Cystitis 570
Calculi and other Foreign Bodies . . . 573
Functional Diseases 574
CHAP. LIII. Vesico-vaginal Fistula 577
Pathological Anatomy and Varieties . . 57
Etiology 580
Symptoms 581
Diagnosis 581
Prognosis 582
Treatment 582
Operation for Closure by Sutures . . 585
Obliteration by Cauterisation . . 595
Closure of the Vagina: Kolpokleisis . 596

PAGE
CHAP. LIV. The Rectum 599
Physiology 599
Examination 601
Diseases 601
Displacements of 602
Fissure of the Anus 602
Piles 604
Recto-vaginal fistula 605
Coccygodynia 606

APPENDIX.

Syphilis 607
Phenomena of an Attack 607
Table of Leading Facts 608
Treatment 611
Syphilis and Marriage 613
Spyhilis and Pregnancy 614
Chlorosis 616
Nature and Pathology 616
Symptoms and Physical Signs 617
Diagnosis 617
Prognosis 618
Treatment 618
Etiology of Uterine Disease 619
Case-Taking 621
Sources of Gynecological Literature 625
Index of Authors 629
Index of Subjects 631

CLASSIFIED LIST OF ILLUSTRATIONS.

To facilitate study, we have grouped the illustrations under the following heads.

Anatomy—naked eye.
Sectional anatomy.
Anatomy—microscopic.
Pathology—naked eye.
Pathology—microscopic.
Charts of etiology.
Gynecological examination.
Instruments.
Operations.

ANATOMY—NAKED EYE.

PLATE I. Surface view of abdomen and thorax . . facing p. 55
„ III. Distribution of ovarian, uterine and vaginal arteries „ 64
„ VIII. Erosion and laceration of cervix . . . „ 280

Fig. Page
1 External genitals . . . 3
2 External genitals in section . 5
3 Hymen of virgin with vertical slit 6
4 Hymen of virgin with oval opening 6
5 Crescentic hymen . . . 6
6 Outlet of bony pelvis . . . 7
7 Dissection of perineal region . 8
8 Diagram of perineal muscles . 9
9 Muscles of clitoris and bulb . 9
10 Oblique coronal section through external genitals . . . 10
11 Transverse section of pelvis . 11
12 Levator ani and coccygeus . . 12
13 Virgin uterus, from front and in section 13
14 Multiparous uterus from front and in section 13
15 Diagram of divisions of cervix . 15
16, 17, 18 Sections of uterus at various levels 16
22 Fallopian tube, ovary and parovarium 20
25 Vagina on vertical section . . 25
26 Anterior vaginal wall and multiparous cervix 26
27 Diagram of vertical mesial section of pelvis 27
28 Horizontal section of pelvic floor at pelvic outlet . . . 28
31 Urethral glands of Skene . . 29
33 Course of the ureters . . . 31

Fig. Page
36 The rectum inflated, showing sphincters 34
48 Diagram of coronal section of pelvis 44
49 Transverse section of pelvis in line of pyriform muscle . . 47
50 Schultze's diagram of position of uterus 48
53 Contents of female pelvis viewed through pelvic brim . . 51
54 Uterus seen through brim, with bladder distended . . . 52
55 Diagram of position of uterus, according to distention of bladder 53
57 Lines of cleavage in pelvic floor . 58
59, 61 Diagram of pelvic floor projection 61, 62
62 Venous supply of uterus and vagina 66
63 Diagram of intra-abdominal pressure 72
64 Outline of figure in genupectoral posture 73
68, 69 Diagram of uterus before and after menstruation . . 82
154 Nulliparous os uteri . . . 242
155 Multiparous os uteri . . . 243
319 Sacral segment of the pelvic floor 512
350 Bladder in systole . . . 561
360 Normal relations of the cervix, the ureters, and the urethra . 579
395 Direction of rectum and of anus in relation to intra-abdominal pressure 600

SECTIONAL ANATOMY.

PLATE II. Coronal section of female cadaver—frozen . facing p. 54
„ IX. Vertical mesial section of pelvis with extra-uterine gestation—frozen . . . . „ 556

Fig. Page
34 Vertical mesial section, showing Y-shape of bladder—frozen . 32
35 Vertical section of pelvis, with bladder contracted—frozen . 33
38 Vertical mesial section showing peritoneum—frozen . . 40, 41
39 Vertical mesial section, with bladder contracted, showing peritoneum—frozen . . . 40, 41
40 Vertical mesial section, with uterus drawn back, showing peritoneum—spirit hardened . 40, 41
41 Vertical mesial section with peritoneum dipping abnormally deep—frozen 40, 41
42 Vertical mesial section, at end of pregnancy—frozen . . 40, 41
43 Vertical mesial section, during parturition—frozen . . 40, 41
44 Vertical mesial section, with bladder distended—frozen . 40, 41
Fig. Page
45 Lateral sagittal section—spirit hardened 41
46 Transverse section at level of hip-joints—frozen . . . 42
47 Coronal section of pelvis—frozen 43
51 Vertical mesial section with bladder distended . . . 49
52 Vertical mesial section with bladder contracted—frozen . 50
56 Vertical mesial section, during parturition—frozen . . 57
65 Vertical mesial section of pelvis in genupectoral posture—frozen 76
274 Vertical mesial section of pelvis from a case of carcinoma uteri —spirit hardened . . . 430
275 Vertical mesial section of pelvis from a case of carcinoma uteri et vaginæ—spirit hardened . 431

ANATOMY—MICROSCOPIC.

Plate VII. Section of Ovary and Wolffian body of a fœtal lamb . . . . . facing p. 202
" " Connective tissue sprouting up and surrounding the germ epithelium . . " "

Fig. Page
19 Course of glands of mucous membrane of uterus . . 18
20 Vertical section through mucous membrane of uterus . . 18
21 Vertical section through mucous membrane of cervix . . 19
23 Section of ovary of cat . . 22
24 Section of human ovary . . 23
Fig. Page
29 Section of posterior wall of bladder and anterior of vagina 28
30 Transverse section of urethra . 29
32 Epithelial cells from vesical mucous membrane . . . 30
37 Perpendicular section through end of rectum . . . 36
70 Mucous membrane of menstruating uterus 83

PATHOLOGY—NAKED EYE.

Plate IX. (with fig. 348) Extra-uterine gestation . . facing p. 556

Fig. Page
101 Cervical canal dilated by a polypus 126
119 Uterus retroverted and fixed with adhesions . . . 157
120 Retro-uterine hæmatocele, with pouch of Douglas obliterated . 165
121 Retro-uterine hæmatocele, with pouch of Douglas not previously obliterated . . 165
122 Ante- and retro-uterine blood effusion 167
123 Free blood in pouch of Douglas . 168
124 Hydrops Tubæ 176
137, 138 Rudimentary uterus . 226, 227
139 Uterus bipartitus . . . 227
140 Uterus unicornis . . . 228
141 Uterus bicornis 228
Fig. Page
142 Uterus septus 229
143 Infantile uterus 229
144 Primary atrophy of uterus . . 230
145 Fœtation in detached horn of uterus 233
146 Uterus septus, puerperal . . 234
147 Conical vaginal portion . . 237
148 Stenosis of os with dilated cervical canal 238
149 Normal and pinhole os in speculum 239
158 Uterus and ovaries from a case of superinvolution . . . 247
160, 161 Hypertrophied vaginal portion of cervix . . . 251, 25
169 Hypertrophy of intermediate portion of cervix . . . 259

Fig.		Page
170	Hypertrophy of supra-vaginal portion of cervix . . .	259
171	Hypertrophy of whole uterus secondary to prolapsus . .	260
173	Single laceration of cervix . .	263
174	Multiple or stellate laceration of cervix	264
194	Diagrammatic scheme of flexions	313
195	Diagrammatic scheme of versions	313
196	Anteflexion with stenosis at os externum	316
197	Diagram to show anteflexion produced by cicatrisation of utero-sacral ligaments . .	317
198	Myoma of anterior wall . .	322
206	Uterus retroverted and bound back by peritonitic adhesions .	332
207	Extreme retroflexion of uterus .	335
208	Congenital retroflexion . .	336
221	Inversion of uterus . . .	356
222	Inversion of uterus + inversion of vagina, caused by a small submucous fibroid . . .	358
223	Inversion of uterus . . .	359
236	Section of a large fibroid tumour, fibres round several centres .	374
237	Section of a fibroid tumour, showing wavy bundles of fibrous tissue	375
238	Section of a fibroid tumour, showing spaces between bundles of fibrous tissue	375
239	Pediculated sub-peritoneal fibroid tumour	376
240	Uterus with elongated cavity due to presence of several fibroids	377
241	Interstitial fibroid tumour .	378
242	Submucous fibroid tumour projecting into uterine cavity .	379
243	Pediculated submucous fibroid in process of extrusion . .	380
244	Cervical polypus having apparently two pedicles . .	382
246	Uterus containing large fibroid tumour	386
247	Case of two-and-a-half months' pregnancy associated with two large fibroids	391
260	Large three-lobed fibroid from the fundus	410
261	Fibrous polypus laid open to show its identity in structure with a fibroid tumour . .	413
262	Intra-uterine submucous fibroid becoming vaginal . . .	414
263	Submucous fibroid which has come to be wholly in the vagina	415
264	Group of mucous polypi growing in the cervix uteri . . .	416
266	Pediculated submucous fibroid .	419
267	Submucous fibroid which simulated Inversion	421
270	Carcinomatous nodule . .	427
273	Carcinoma of cervix uteri producing fistula	430
274	Vertical mesial section of pelvis in carcinoma uteri . . .	430
275	Vertical mesial section of pelvis in carcinoma vaginæ et uteri .	431
278	Cauliflower excrescence growing from cervix uteri . . .	439
280	Carcinoma of the cervix leading to occlusion of os uteri . .	444
281	Mode of the spreading of carcinoma	449
286	Cervix uteri amputated for cauliflower excrescence of posterior lip	455
291	Carcinoma of the body of the uterus	465
292	Sarcoma uteri with tumours in the vagina	468
294	Section of sarcoma uteri, showing fibroid nodules . . .	469
295	Sarcoma uteri invading Fallopian tubes	470
298	Atresia vaginæ, seen from behind	477
299	Case of double atresia . .	478
300	Atresia hymenalis . . .	481
301	Atresia vaginæ—lower third .	481
302	Atresia of cervix at os externum	482
303	Atresia of cervix at os internum	482
306	Atresia in a septate uterus . .	487
311 to 315	Normal development of external organs of generation	502, 503
316, 317	Spurious hermaphroditism .	504
318	Abscess of the Bartholinian gland	509
320	Central rupture of the perineum	514
326	Hernial nature of prolapsus uteri	525
340	Posterior vaginal enterocele .	533
341	Dysmennorhœal membrane as seen under water . . .	540
342	Dysmennorhœal membrane laid open	541
343	Retroflexion of gravid uterus producing distension of the bladder	546
344	Gestation in detached left horn .	549
345	Interstitial gestation . . .	550
346	Fallopian-tube gestation . .	551
347	Section of a uterus in a tubo-abdominal pregnancy of seven months' duration . . .	552
349	Extra-uterine pregnancy of seven months' duration . . .	557
355	Caruncle at urethral orifice .	568
356	Large stone extracted by vaginal lithotomy	574
357	Chief varieties of urinary fistula	578
358, 359	Deep and superficial vesico-vaginal fistula	578
361	Relation of peritoneum to a fistula	580
396	Rectocele	602
398	Teeth in hereditary syphilis .	616

PATHOLOGY—MICROSCOPIC.

Plates VI. and VII. Foulis cells, from ascitic fluid in malignant tumour of ovary . . . . . facing p. 198, „ p. 202
Plate VIII. Section of cervix with simple erosion . . „ p. 280

Fig.		Page
126	Cellular bodies—the source of ovarian cysts	195
127	Diseased bloodvessels in ovary .	196
128	Epithelial tubes—the source of ovarian cysts	197
129	Papillæ of ovarian cyst wall .	198
130	Colloid degeneration of ovarian stroma	199
131	Cells from ovarian fluid . .	201
179	Papillary form of erosion . .	274
180	Follicular form of erosion . .	275
181	True ulceration of the cervix .	276
186	Hypertrophied glands in endometritis	286
187	Mucous membrane in endometritis fungosa	287
188	Dilated bloodvessels in endometritis	287
189	Granulation from endometritis composed of embryonic tissue	288
193	Section of uterine tissue in chronic metritis . . .	303
265	Section of a mucous polypus of the cervix	416
271	Section of a portion of cervix uteri with carcinomatous nodule	428
272	Section of a flat cancroid of the cervix	429
279	Scraping from carcinoma of the cervix	440
293	Section of mucous membrane in sarcoma	469
296	Scraping from a fibroid tumour	473
297	Scraping from a spindle-celled sarcoma	473
307	Granular vaginitis—acute form .	490
308	Granular vaginitis—chronic form	490
309	Colpitis emphysematosa . .	490
310	Section of vaginal cyst . .	497

CHARTS OF ETIOLOGY.

Fig.		Page
245	Influence of age on development of fibroid tumour . . .	384
276	Influence of sex on development of carcinoma	433
277	Influence of age on development of carcinoma	435

GYNECOLOGICAL EXAMINATION.

Plate IV. Female cadaver in semiprone posture . . facing p. 107
„ V. Female cadaver in semiprone posture, with Sims' speculum passed and uterus drawn down with volsella . . . . . . „ 108

Fig.		Page
66	Anteversion produced by digital pressure	77
67	Retroversion produced by digital pressure	78
71, 72	Right hand in Bimanual .	94
73	Left hand in Bimanual . .	95
74	Displacement of pelvic floor and abdominal wall in Bimanual .	97
75	Right hand in abdomino-recto-vaginal examination . .	99
78	Uterus drawn down by volsella .	104
84	Method of holding Sims' speculum	108
92	First stage of passing sound .	115
93	Second stage of passing sound, in retroverted uterus . .	116
94	Proper contrasted with improper method of turning the sound .	117
95	Second stage of passing sound with uterus to the front . .	117
96	Sound arrested in anteflexion .	118
97	Sound combined with Bimanual	121
102	Introduction of tangle tents .	127
132	Area of dulness in ovarian tumour and ascites . .	206
198	Diagnosis between fibroid and anteflexion	322
209	Diagnosis of retroflexion by Bimanual	340
225, 226, 227	Diagnosis of inversion and polypus in vagina . .	362
228, 229	Diagnosis of partial inversion and intra-uterine polypus .	363
230	Uterine polypus + Inversion .	364
248	Sound used to detect pediculated submucous fibroid . . .	392
300, 303	Diagnosis of various forms of atresia . . .	481, 482
354	Catheterisation of ureters . .	566
399-401	Diagrams for case-taking	623, 624

INSTRUMENTS.

Fig. Page
60 Callipers for measuring pelvic floor projection . . . 61
76 A. R. Simpson's volsella . . 102
77 Hart's volsella 103
79 Sims' tenaculum . . . 105
80, 81 Sims' speculum . . . 107
82 Bozeman's speculum . . . 107
83 Battey's speculum . . . 107
85 Fergusson's speculum . . 109
86, 87 Neugebauer's speculum . . 110
88 Barnes' crescent speculum . 111
89 Cusco's speculum . . . 111
90 Sir J. Y. Simpson's sound . . 113
91 A. R. Simpson's sound . . 114
98 Laminaria tents before and after expansion 124
99 Tupelo tents before and after expansion 125
100 Tupelo tent expanded . . 125
103 Tait's dilators 128
104 Hanks' dilators 129
105 Recamier's curette . . . 130
106 Simon's scoop 131
107 Thomas' curette, modified by A. R. Simpson . . . 131
108 Sims' curette 131
109 Bozeman's scissors . . . 133
110 Kuchenmeister's scissors . . 134
111 Hart's scissors 134
112 Emmet's needles . . . 135
113 Needle-holder 135
114 Higginson's syringe . . . 136
115 Vaginal douche 137
116 Paquelin's cautery . . . 138
117 Cones for cautery . . . 139
118 Chloroform drop-cork . . 142
125 Mundé's pessary for prolapsed ovary 185
133 Spencer Well's trocar . . 215
134 Ordinary trocar 215
135 Nélaton's forceps . . . 215
136 Spencer Wells' clamp . . 216
150 Schultze's dilator . . . 240
151 Marion Sims' dilator . . . 241
152 Sir J. Y. Simpson's metrotome . 241
157 Glass plug for cervical canal . 244
159 Galvanic intra-uterine stem . 248
168 Rake for removing sutures . 257
199 Intra-uterine stem pessary made of copper 324
200 Greenhalgh's intra-uterine stem 325
202 Graily Hewitt's cradle-pessary . 330
203 Gehrung's anteversion pessary . 330
204 Gehrung's anteversion pessary as placed by Mundé . . . 331

Fig. Page
205 Thomas' anteversion pessary . 331
213 Hodge pessary 347
214 Albert Smith Pessary . . 348
215 Side view of Albert Smith pessary 348
218 Hodge pessary *in situ, ad naturam* 351
219 Position and support of pessary illustrated 352
220 Position and action of pessary in vagina 353
249 A. R. Simpson's nail-curette for fibroids 399
250 Thomas' spoon-saw . . . 399
251 Sims' enucleator 399
252 Sir J. Y. Simpson's volsella for intra-uterine fibroids . . 400
255 Thomas' clamp for pedicle of fibroids 405
256 Péan's curved needle for ligaturing pedicle of fibroids . . 405
257 Cintrat's serre-nœud . . . 406
258 Kaltenbach's needle for elastic ligature 407
268 Forceps with catch for mucous polypi 423
269 Sir J. Y. Simpson's polyptome . 424
282 Simon's sharp spoon . . . 451
283 Chain ecraseur 452
304 Perforated glass plug used after operation for atresia vaginæ . 485
305 Breisky's instruments for operating in atresia with retention . 486
327 Greenhalgh's pessary with transverse bars 526
328 Ring pessary with diaphragm . 526
329 Simple ring pessary . . . 526
330 Ring pessary *in situ* . . . 527
331 Pessary for prolapsus . . . 527
332 Zwanck's pessary . . . 527
351, 352 Simon's urethral specula . 564
353 Skene's urethral specula . . 565
356 Skene - Goodman self - retaining catheter 572
365, 366, 367 Knives for operating on fistulæ 586
368 Sponge-holder 586
369, 370 Sir J. Y. Simpson's tubular needle and method of use . 587
373, 374 Bozeman's fork and method of use 589
378 Bozeman's suture adjuster . . 591
379, 380 Coghill's wire-twister and method of use . . . 591

OPERATIONS.

Fig. Page
153 Incision made by metrotome . 242
156 Bilateral division of cervix with Kuchenmeister's scissors . 243
162 Sims' method of passing the sutures after amputation of cervix 253
163 Marckwald's method of splitting and stitching the cervix in amputation 254

Fig. Page
164 A. R. Simpson's method of amputating the cervix . . 255
165, 166 Introduction of sutures in amputation of cervix . . 256
167 Hegar's method of passing the sutures 256
172 Amputation of hypertrophied cervix in prolapsus uteri . 261

Fig. Page
175 Emmet's operation — denuded surface 269
176 Denuded surface as made by Emmet 270
177 Emmet's operation—introduction of sutures 271
178 Emmet's operation — tying of sutures 271
182 Forceps dressed with cotton wadding for applications to cervical canal 282
183 Barnes' speculum for introducing vaginal tampons . . . 282
184, 185 Schrœder's excision of cervical mucous membrane . . . 283
190 Sound dressed with wadding for intra-uterine applications . 295
191 Curetting of uterus . . . 296
192 Sir J. Y. Simpson's porte-caustique 297
201 Sims' division of cervix, lines of incision 326
210 Reposition of retroflexed uterus by finger in rectum . . 343
211 Reposition of retroverted uterus with the sound . . . 345
212 Reposition of uterus with volsella, and finger in rectum . . 346
216 Introduction of pessary . . 349
217 Pessary carried on by finger . 350
224 Drawing-down of inverted uterus with tape-noose and lines of incision for Barnes' operation . 362
231 Reposition of inverted uterus with the hand . . . 366
232 Reposition of inverted uterus with White's repositor . . 367
233 Reposition of inverted uterus with finger in bladder and rectum 368
234 Emmet's method of retaining partially replaced uterus with sutures 369
235 Cup with stem for gradual reduction of inversion . . . 370
253 Schrœder's amputation of uterus at level of os internum . . 403
254 Ligature of uterine stump treated intra-peritoneally . . . 404
259 Extra-peritoneal treatment, with elastic ligature, of pedicle of fibroids 408
284 Wire ecraseur used to amputate cervix 453
285 Chain ecraseur applied to cervix in amputation . . . 454
287 Schrœder's supravaginal amputation of cervix . . . 457

Fig. Page
288 Sims' method of removing carcinomatous cervix . . . 458
289, 290 Freund's extirpation of the uterus 460
321-323 A. R. Simpson's operation for complete rupture of the perineum 518
324 Position of sutures in above, as seen in section . . . 519
325 Hildebrandt's method of passing sutures in repair of perineum 519
329 Introduction of ring pessary . 526
333-336 Operation for repair of perineum 528, 530
337 Various forms of raw surface made on posterior vaginal wall in operation for prolapsus . 530
338 Raw surface as made by Martin 531
339 Raw surface on anterior vaginal wall, as made by Sims . . 532
358 Closure of superficial vesico-vaginal fistula 578
359 Closure of deep vesico-vaginal fistula 578
361 Relations of peritoneum to extensive fistula 580
362 Simon's method of paring edges of fistula 583
363 Silk sutures passed to close fistula 584
364 American and German methods of paring edges of fistula contrasted 584
371 Knife transfixing edges of a fistula 588
372 Fistula closed with sutures . 588
374 Fork used to prevent sutures from cutting 589
375 Counter-pressure made with blunt hook 589
376, 380 Method of twisting sutures 590, 591
377 Mode of tying wire sutures . 590
381, 382 Bozeman's method of fixing sutures with plates and shot . 591
383, 392 Removal of sutures . 591, 595
384, 385 Closure of a four-cornered fistula 592
386 Anterior lip of cervix used to close fistula 592
387 Cervix split and stitched in closure of a fistula . . . 593
388 Obliteration of cervical canal for vesico-uterine fistula . . 594
389 Operation for atresia urethræ in fistula 594
390, 391 Sims' stationary catheter . 594
393, 394 Simon's operation for closure of vagina : kolpokleisis 597, 598
397 Division of base of an anal fissure 603

Pp. 4, 5.—*For* "lithographic frontispiece," *read* "Plate I."

P. 107.—*For* "in the Sims' or semiprone posture," *read* "in the Sims', or in the semiprone posture."

P. 557.—*For* "three-months pregnancy," *read* "four-months pregnancy."

SECTION I.

ANATOMY AND PHYSIOLOGY OF THE FEMALE PELVIC ORGANS.

IN order to give a comprehensive idea of the Anatomy and Physiology of the Female Pelvic Organs, it will be advisable to consider it in the following manner :

Chapter I. (1.) The External Genitals as observed clinically. (2.) the Pelvic floor and organs resting on it considered as a whole. (3.) the Pelvis considered in detail as follows :—Musculature of Pelvic Floor; Uterus, Fallopian Tubes, and Ovaries; Vagina; Bladder; Rectum and Perineal Body; Peritoneum and Connective Tissue.

Chapter II. The position of the Uterus and its annexa, and the Viscera superjacent to the Pelvic Organs.

Chapter III. The Structural Anatomy of the Pelvic Floor; Pelvic Floor Projection.

Chapter IV. The Bloodvessels, Lymphatics, and Nerves of the Pelvis. Development of Pelvic Organs.

Chapter V. Physics of the Abdomen and Pelvis with special reference to the Semiprone and Genupectoral Postures.

Chapter VI. Ovulation and Menstruation.

CHAPTER I.

LITERATURE.

External Genitals. *Budin*—Recherches sur l'hymen et l'orifice vaginal: Paris, 1881. *Matthews Duncan*—Papers on the Female Perineum: Churchill, London, 1880. *F. P. Foster*—A Contribution to the Topographical Anatomy of the Uterus and its Surroundings: Am. J. of Obst., Vol. XIII., p. 30. *Garriguez*—The Obstetric Treatment of the Perineum: Am. J. of Obst., Vol. XIII., p. 231. *Henle*—Handbuch der Eingeweidelehre des Menschen: Braunschweig, 1866.

Muscles of Pelvic Floor. *Cunningham*—The Dissector's Guide; Abdomen: Maclachlan & Stewart, Edinburgh, 1880. *Henle*—op. cit. *Luschka*—Die Musculatur am Boden des weiblichen Beckens: Wien, 1861. *Savage*—Female Pelvic Organs, 2d Edition: London, 1870. *Turner*—An Introduction to Human Anatomy: A. & C. Black.

Uterus, and Annexa; Vagina. *Barnes*—The Diseases of Women: London, 1878. *Breisky*—Die Krankheiten der Vagina: Billroth's Handbuch, Stuttgart, 1879. *Cruveilhier*—Traité d'Anatomie Descriptive: Paris 1871. *Engelmann*—The Mucous Membrane of the Uterus: Am. J. of Obstetrics, Vol. VIII., p. 30. *Farre*—The Uterus and its Appendages: Todd's Cyclopædia, Vol. V. *Hart*—Structural Anatomy of Female Pelvic Floor: Maclachlan & Stewart, 1880. *Henle*—op. cit. *Hennig*—Der Katarrh der inneren weiblichen Geschlechtstheile: Leipzig, 1862. *Mundé*—Prolapse of the Ovaries: American Gynecological Transactions, Vol. IV., 1879. *Rainey*—On the Structure and Use of the Ligamentum Rotundum Uteri: Lond. Phil. Tr., 1880, p. 515. *Ruge and Veit*—Zur Pathologie der Vaginal Portion: Stuttgart, 1878. *Sappey*—Traité d'Anatomie Descriptive: Paris, 1873. *Schrœder*—Handbuch der Krankheiten der weiblichen Geschlechtsorgane: Leipzig, 1879. *Taylor*—American Journal of Medical Science, Vol. LXXX., p. 126. *Turner*—op. cit.

Bladder. *H. J. Garriguez*—Remarks on Gastro-Elytrotomy: Am. Gynecol. Tr., Vol. III., p. 212. *Skene*—Diseases of the Bladder and Urethra: New York, 1870. *Skene*—The Anatomy and Pathology of Two Important Glands in the Female Urethra: Am. J. of Obstetrics, Vol. XIII. *Winckel*—Die Krankheiten der weiblichen Harnröhre und Blase: Billroth's Handbuch, Stuttgart, 1877.

Rectum. *Braune*—Topographisch anatomischer Atlas, Zweite Auflage: Leipzig, Veit & Co., 1872. *Chadwick*—The Function of the Anal Sphincters so-called: Am. Gyn. Tr., Vol. II., p. 43. *Pirogoff*—Anatome Topographica, sectionibus per corpus humanum congelatum: Petropoli, 1859. *Ruedinger*—Topographisch-Chirurgische Anatomie des Menschen: Vierte Abtheilung.

Perineal body. *Hart*, *Henle*, *Savage*, op. cit. *T. G. Thomas*—The Female Perineum; its Anatomy, Physiology and Pathology: Am. J. of Obstetrics, Vol. XIII., p. 312.

Peritoneum and Cellular Tissue. *Bandl*—Die Krankheiten der Tuben, der Ligamente, und des Beckenperitonäums: Stuttgart, 1879. *Barnes*—St George's Hospital Reports, Vol. VII., p. 57. *Freund*—Anatomische Lehrmittel zur Gynäkologie: Beiträge zur Geburtshülfe und Gynäkologie. Herausgegeben von der Gesellschaft für Geburtshülfe in Berlin. IV. Band, 1 Heft. S. 58. *Guérin*—Sur la Structure des Ligaments larges: Comptes Rendus, 1879, 1364. *Le Bec*—Contribution a l'étude des ligaments larges (au point de vue de l'anatomie et de la pathologie): Gaz. Hebd., 15 Avril 1881. *De Sinéty*—Gynecologie: Paris, 1880. *Spiegelberg*—Remarks upon Exudations in the Neighbourhood of the Female Genital Canals: German Clinical Lectures (New Syd. Soc. Tr.), p. 169. *Braune, Cunningham, Hart, Pirogoff*, op. cit.

(1.) EXTERNAL GENITALS AS OBSERVED CLINICALLY.

UNDER the term external genitals are comprised the structures known as Labia Majora, Fourchette, Labia Minora, Clitoris with its prepuce, Vestibule, and Fossa Navicularis. For clinical convenience the urethral orifice and hymen also are described with these; although the urethral orifice belongs to the urinary system, and the hymen separates anatomically the external genitals (vulva) from the vagina.

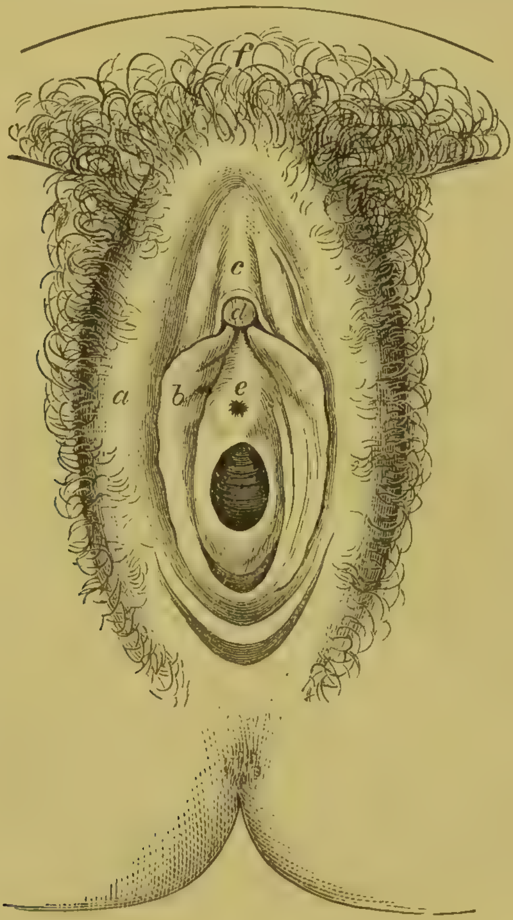


FIG. 1.

External Genitals of Virgin, with Diaphragmatic Hymen. The Labia Majora and Minora are drawn apart, and the prepuce drawn back.

a Labium majus; *b* Labium minus; *c* Praeputium clitoridis; *d* Glans clitoridis; *e* Vestibule just above urethral orifice; *f* Mons Veneris. (½)

The *Labia Majora* (fig. 1. *a*) are two thick folds of hair-clad skin, running parallel to the anteroposterior diameter of the pelvic outlet.

extending from the symphysis pubis backwards between the thighs, and meeting each other posteriorly in the middle line about 2.7 cm. (1 inch) in front of the anus. Each labium has an outer and inner surface, and consists of a thick fold of skin enclosing a quantity of fat, blood-vessels, and dartos. Superiorly, where they are best developed, they form by their junction—anterior commissure—the structure known as the mons veneris (*vide* lithographic frontispiece); while posteriorly, they are a mere fold of skin known as the *Fourchette* or posterior commissure. The fat and connective tissue are therefore almost entirely wanting at the fourchette, which is not a distinct structure but is simply the posterior junction of the thinned-out labia majora. Both labia are, in the adult, covered with crisp hair which is most abundant over the mons veneris and outer surface but very much less on the inner.

The *Labia Minora* (fig. 1. *b*) are two small oblique folds of skin, one on the inner surface of each labium majus. Posteriorly they blend insensibly with the labium majus at about its middle, while anteriorly they converge and each divides into two small branches, an upper and a lower. The upper branches meet to form the prepuce of the clitoris (fig. 1. *c*), while the lower in a similar way form its suspensory ligament. As a rule the labia minora do not, in the adult, project beyond the labia majora. Sebaceous glands are present on both labia.

The *Clitoris*, covered by its prepuce, lies in the middle line and at the apex of the smooth piece of mucous membrane known as the vestibule. Only that part analogous to the glans penis is seen (fig. 1. *d*). The clitoris proper consists of two crura which arise from the rami of the ischium and pubis and unite superiorly to form the body of the clitoris, which lies beneath the mucous membrane. The glans clitoridis is not directly continuous with the body, but joins it through the pars intermedia of the bulb (*vide post*, p. 10).

The *Vestibule* (fig. 1. *e*) is a triangular smooth mucous surface bounded superiorly by the clitoris, laterally by the labia minora, and inferiorly by the upper margin of the vaginal orifice. In the middle line at its base the dimple of the urethral orifice can be distinctly felt 2-2.5 cm. (1 inch) in front of fourchette. Small depressions and mucous glands open on its surface.

The *Vaginal Orifice* lies in the middle line between the base of the vestibule and the fossa navicularis. Its orifice is guarded by the *hymen*, a thin fold of mucous membrane enclosing some connective tissue, blood-vessels, and nerves (?) The hymen may be crescentic in shape, attached to the posterior margin of the vaginal orifice, and with free edge towards the base of the vestibule (figs. 2 and 5); or diaphragmatic, attached all round the vaginal orifice, but with a small hole (figs. 1 and 4) or vertical slit (fig. 3) in it. Sometimes it is not so perforated, constituting a pathological condition.

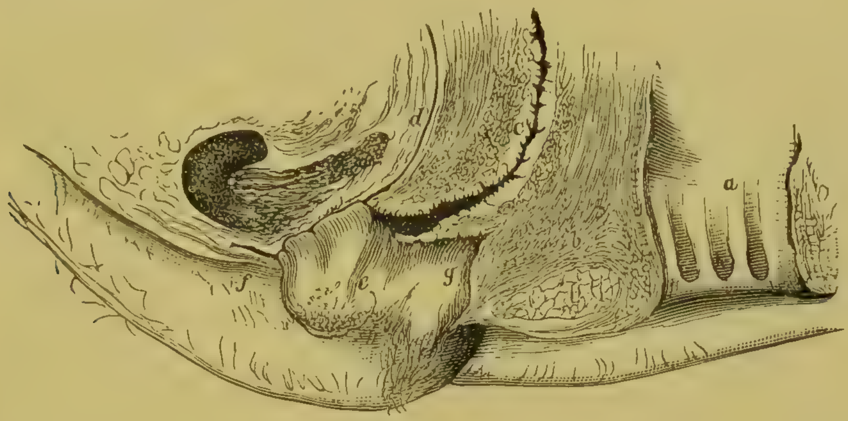


Fig. 2.

Vertical Mesial section of External Genitals (Henle).
a Anus; *b* Perineal body; *c* Vagina; *d* Urethra; *e* Labium Minus; *f* Prepuce of Clitoris; *g* Fossa Navicularis, with Hymen in front and Fourchette behind. (½)

Fossa Navicularis.—Normally, the inner aspect of the fourchette is in contact with the outer and lower surface of the hymen. When the fourchette is pulled down by the finger, a boat-shaped cavity is made—the fossa navicularis. Its posterior boundary is, therefore, the inner aspect of the fourchette; its anterior, is the posterior aspect of the hymen. These two are in contact unless artificially separated. The ducts of the Bartholinian glands open into the fossa by small pin-hole apertures (fig. 2).

From behind forwards, in the female ano-vulvar region there lie in the middle line the following structures :—

(1.) Anus.
(2.) Skin over base of Perineal Body.
(3.) Fourchette.
(4.) Fossa Navicularis.
(5.) Vaginal orifice, with Hymen or its remains.
(6.) Urethral orifice.
(7.) Vestibule.
(8.) Clitoris with its prepuce.

Laterally we have the labia majora and minora.

The following points should be carefully noted. In the nude erect female only the mons veneris is seen (*vide lithog. frontis.*). The well developed labia majora have their inner surfaces always in contact and are only slightly separated by the widest divergence of the knees. The labia minora are always in contact and require to be artificially separated in order to see their inner surfaces. The fossa navicularis only exists when artificially opened up. Therefore, to see the external genitals fully, the labia must be separated and the prepuce drawn back.

A line running as follows separates mucous membrane from skin. Starting from the base of the inner aspect of the right labium minus, it passes *down* beside the base of the outer aspect of the hymen, *up* along the base of the inner aspect of the left labium minus, *in* beneath the prepuce of the clitoris, and *down* to where it first started from.

The vulvar slit is vertical, and lies in the middle line between the labia majora and minora.

The vaginal orifice is transverse, only exists when artificially made, and is anatomically defined by the hymen which separates the external genitals from the internal genitals. The sharp line between skin and mucous membrane can be distinctly seen on the living woman. The labia minora are skin, thin and fine, and not mucous membrane as often alleged.

The following measurements by Foster are useful for reference :—

	Tip of Coccyx to anus.	*Anus to fourchette.*
Average distance in nulliparae, . .	4·5 cm. . .	2·7 cm.
,, ,, multiparae, . .	4·7 cm . .	2·5 cm.

Meatus urinarius, 2—2·5 cm. from fourchette, in nulliparae ; 2—3·1 cm., in women who have borne children.

The virginal vaginal orifice should have the appearances shown at figs. 1, 3, 4, and 5, and the free edge of the hymen should be intact.

In a healthy woman who has experienced complete coitus, the hymen is torn or often only stretched. It admits two fingers without pain. In a woman who has borne full-time children, the vaginal orifice is always torn though the fourchette and all behind it may be intact. The

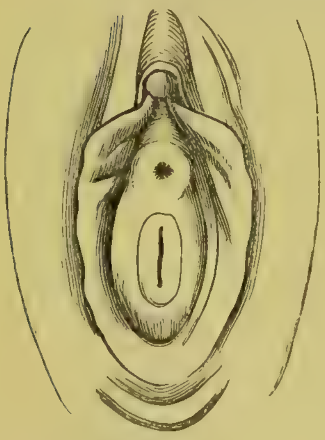


Fig. 3.

Hymen of Virgin with Vertical Slit. (½)

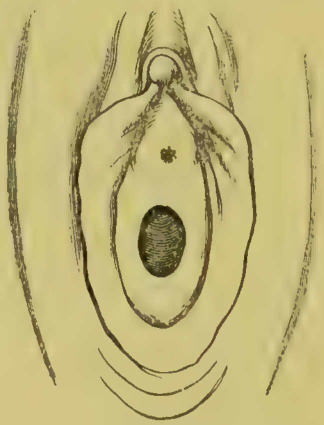


Fig. 4.

Hymen with oval opening. (½)

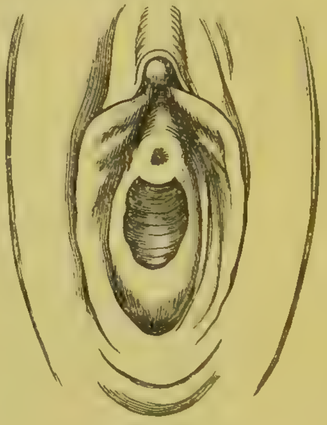


Fig. 5.

Crescentic Hymen. (½)

remains of the hymen are known as the carunculae myrtiformes. In addition, the passage of the child's head may cause tears of the posterior vaginal wall, perineal body, or even anterior wall of rectum.

(2.) THE PELVIC FLOOR AND ORGANS RESTING ON IT CONSIDERED AS A WHOLE.

The outlet of the bony female pelvis is filled in by what is generally described as the 'soft parts.' This term, however, should not be employed, as it is misleading, especially in scientific obstetrics. It is better named the pelvic floor or pelvic diaphragm.

The pelvic floor is a thick fleshy elastic layer, dovetailed in all round to the bony pelvic outlet (Fig. 6). It may be considered as an irregularly-edged segment of a hollow sphere, with an outer *skin* aspect and an inner *peritoneal* one. On the outer skin aspect lie the external genitals already described. On the inner peritoneal surface, we have the organ known as the uterus, and its appendages the Fallopian tubes and ovaries. The vagina runs at an angle of 60° to the horizon from the vaginal orifice upwards to the mouth of the womb, as a transverse slit in the pelvic diaphragm. In front of the vagina lies the bladder, while behind it the rectum is placed; these structures, along with muscles, connective tissue, blood-vessels, nerves, and lymphatics, making up the pelvic diaphragm.

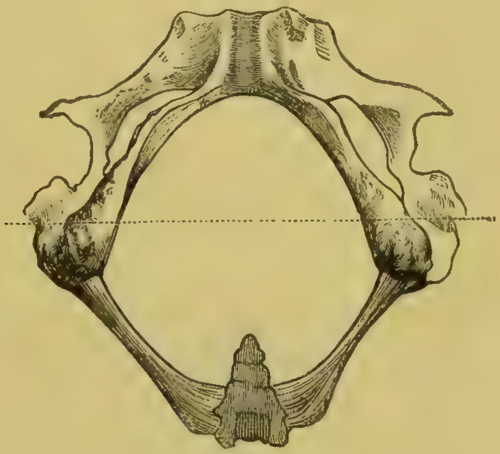


Fig. 6.

Bony Pelvic outlet, with transverse line showing Rectal and Urethral Triangles (D. J. Cunningham). (¼)

Figure 1 shows, accordingly, the pelvic floor seen from its convex, skin aspect; fig. 53 gives it and the organs resting on it as viewed from its concave, peritoneal side; while fig. 34 displays it as seen in vertical sagittal section.

(3.) THE PELVIS CONSIDERED IN DETAIL.

MUSCULATURE OF THE PELVIC FLOOR.

If a female cadaver be placed in the Lithotomy posture and a transverse line drawn just in front of the ischial tuberosities, the perineal region will be divided into a posterior rectal triangle and an anterior urethral one (Fig. 6). The former contains the anus, the latter the external genitals. By suitable incisions the skin and superficial fascia, fat, &c., can be removed around the anus, and the ischiorectal fossa defined. This is a small pyramidal cavity on each side of the rectum, bounded externally by the obturator internus muscle, internally by the levator ani. Its apex is formed by the junction of these muscles, while its base is partially closed in by the transversus perinei and the edge of the gluteus maximus muscle (Fig. 7). If the skin, superficial fascia, and anterior layer of the triangular ligament be now removed from the urethral triangle, the following muscles, &c., will be exposed (Fig. 7).

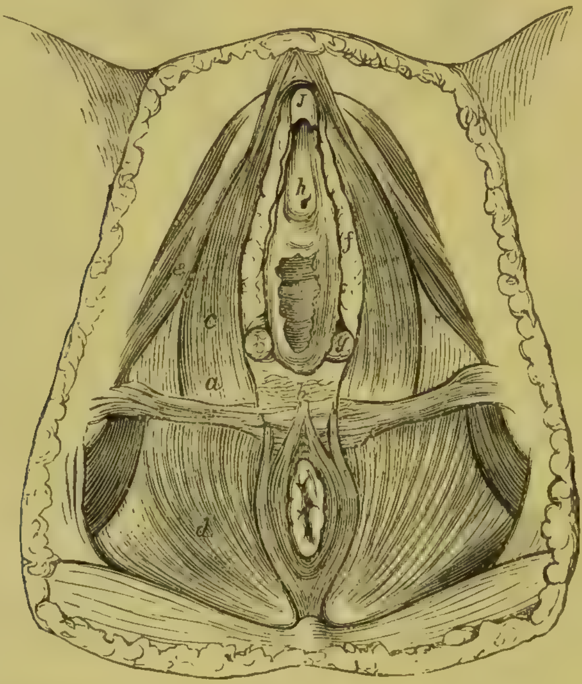


Fig. 7.

Dissection of Perineal Region (Savage).
a is just above Transversus Perinei; *b* Base of Perineal body; *c* Bulbocavernosus; *d* lies on Levator Ani and in Ischiorectal Fossa; *e* Erector Clitoridis; *f* Bulb of Vagina: *g* Bartholinian Gland; *h* Vestibule *i* Glans Clitoridis. (½)

Perineal muscles.—On each side of the vaginal orifice three muscles lie, viz., the bulbocavernosus (fig. 8, *b c*), erector clitoridis or ischiocavernosus (fig. 8, *e c*), and transversus perinei (fig. 8, *t p*).

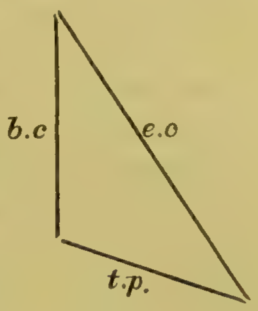


Fig. 8.

The *Bulbocavernosi* consist of two muscular slips, one on each side of the vaginal orifice, which spring behind from the perineal body and pass round the vaginal orifice, partially covering the bulb and the vagina (fig. 7, *c*). The anterior end of each slip splits into three portions, which end as follows:—one passes to the under surface of the corpus cavernosum of the clitoris, a second goes to the posterior surface of the bulb, and a third blends with the mucous membrane between the clitoris and urethral orifice (Henle, *v.* Fig. 9).

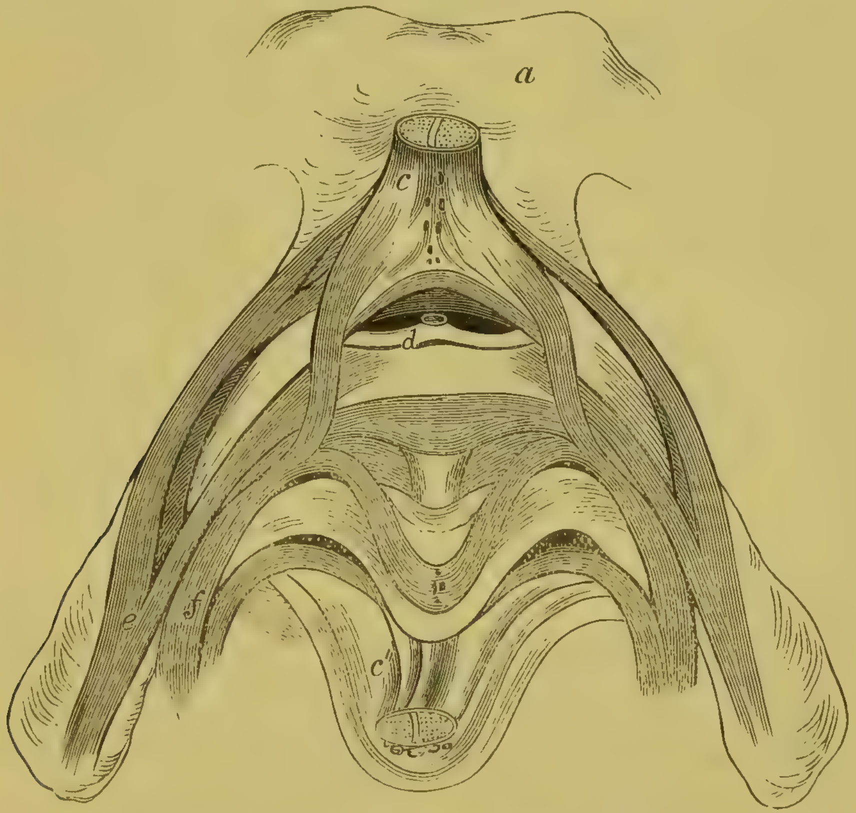


Fig. 9.

a Symphysis Pubis, showing muscles in connection with Clitoris and Bulb. The Clitoris, *c*, *c*″, is cut across near its point, and thrown down with the vestibulary mucous membrane (Henle).
e Erector Clitoridis; *f* Bulbocavornosus with its three insertions; *d* venous branch to Dorsal Vein of Clitoris. (½)

The *Erector Clitoridis* arises from the inside of the ischial tuberosity, and becomes inserted into back and sides of the crus clitoridis. (Fig. 9, *e*).

The *Transversus Perinei* arises from the ramus of the ischium and passes to the perineal body. It is difficult to define practically in dissection (fig. 7, *a*).

Now that these muscles are defined, we are in a position to localize more important structures.

The *Bulbi Vaginæ* (corpora cavernosa uretræ) are small masses of erectile tissue about the size of a bean, lying one on each side of the vaginal orifice and partly under cover of the bulbo-cavernosus muscle. Each rests posteriorly on the triangular ligament, internally on the mucous membrane of the vagina; while, as already said, they are partly covered superiorly by the bulbo-cavernosus muscle. Anteriorly each blends with its fellow, and this *pars intermedia* becomes continuous with the clitoris (fig. 7, *f*).

The *Bartholinian Glands* lie one on each side of the vaginal orifice, close to the posterior end of the bulb and behind the anterior layer of the triangular ligament (figs. 7, *g*, and 10, *e*). Each has a long duct opening into the fossa navicularis.

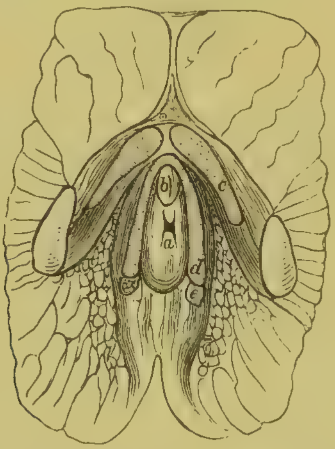


Fig. 10.

Oblique Section, parallel to the Anterior Pelvic Wall and through the External Genitals (Henle). *a* Vagina; *b* Urethra; *c* Corpus Cavernosum Clitoridis, covered by its Erector; *d* Bulbus Vaginae, covered by Bulbocavernosus Muscle; *e* Bartholinian Gland.

Between the lower one-third of the posterior wall of the vagina and the anterior wall of the rectum is an angular interspace (fig. 2, *b*) filled up by the structure known as the perineal body. This will be more fully described afterwards. At the present stage of the dissection only its base is seen, with the following muscles taking origin from or having an insertion into it,—sphincter ani, transversus perinei, bulbocavernosus, levator ani (fig. 7).

Between the layers of the triangular ligament lie the urethra, a portion of the vagina, compressor urethrae, dorsal vein of the clitoris, internal pudic vessels and nerves, the artery to bulb, dorsal nerve of clitoris, and Bartholinian glands (Cunningham).

The dissection of the urethral triangle has now been considered until the bladder has been exposed as it lies behind the pubis from which it is separated by a considerable amount of loose fatty tissue. In order to complete the consideration, we have now to take up the muscles not yet described, viz., the levator ani and coccygeus.

The pelvic floor must now be looked at from its internal concave or peritoneal aspect. If the peritoneum and connective tissue beneath it, with the nerves and blood-vessels, be removed on one side of the pelvis, say the right, the two muscles known as the coccygeus and levator ani will be exposed. These spring from the middle of the inner side of the true pelvis and, blending partly directly and partly indirectly with one

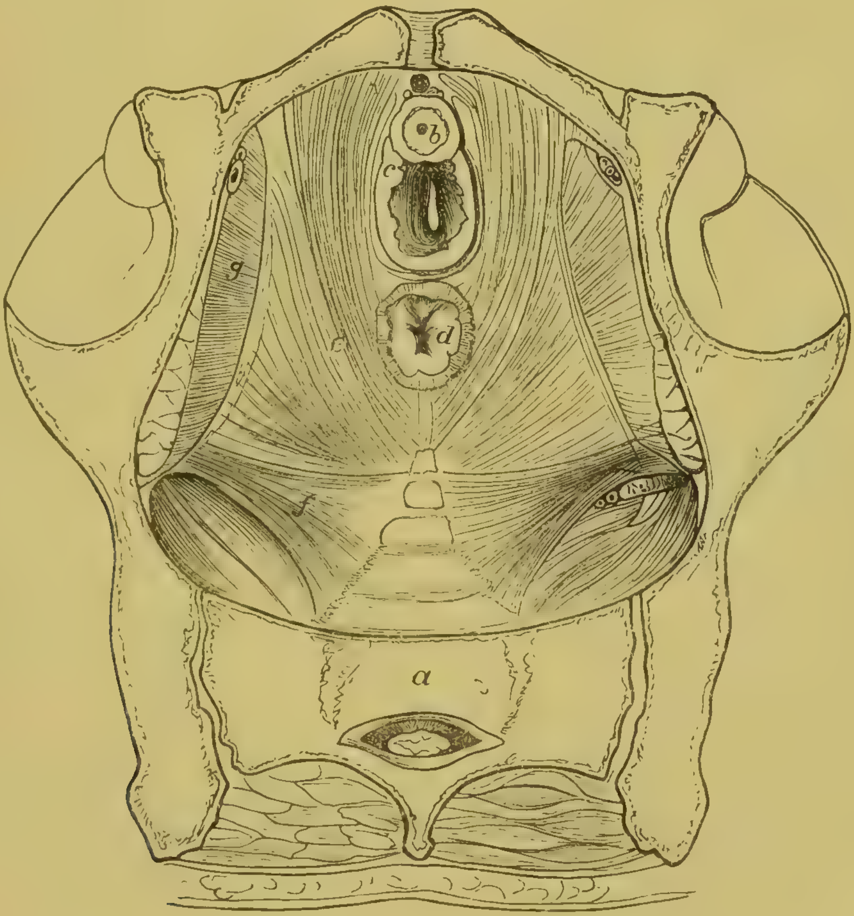


Fig. 11.

Transverse Section of Pelvis from above (Savage). (½)
a Sacrum; *b* Urethra; *c* Vagina; *d* Rectum; *e* Levator Ani; *f* Coccygeus; *g* Obturator internus.

another, form what may be termed the diaphragmatic muscles of the pelvic floor. If looked at through the pelvic brim, they are seen to form on both sides a concave arrangement analogous to the thoracic diaphragm (Fig. 11).

The *Coccygeus* springs from the spine of the ischium and is inserted into the side of the lower part of the sacrum and side and front of coccyx. There are two coccygei, one on each side (Figs. 11 and 12).

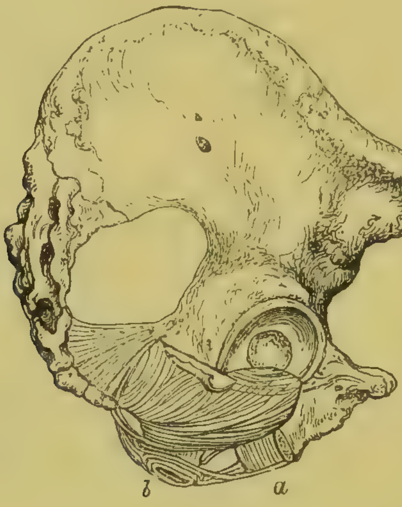


Fig. 12.

Levator Ani and Coccygeus seen from without, after removal of part of hip bone and clearing out of Ischiorectal Fossa (Luschka).
a Fibres of Levator Ani on Vagina; *b* Anus, with Sphincter. (½)

The *Levator Ani* has an extensive origin. It springs in front from the back of the pubis, from the pelvic fascia (white line) and the spine of the ischium. From this the muscle sweeps downwards and inwards to become attached in the middle line from before backwards as follows,—to the vagina, the rectum, its fellow of the opposite side, and finally to the tip of the coccyx (Fig. 12).

Luschka's monograph may be consulted for a more minute account.

We have now to take up the consideration of the generative organs. It is difficult to describe these without alluding to structures not fully considered until further on. The student may, therefore, not entirely grasp some of the points until the whole anatomy of the organs has been mastered.

THE UTERUS AND ITS ANNEXA.

The Uterus is a triangular body, with a truncated apex downwards, placed between the bladder and rectum, and with the appearance seen at Figs. 13, *A* and 14, *B*. In describing it we take up its external appearance, its nature on section, and its structure and relations.

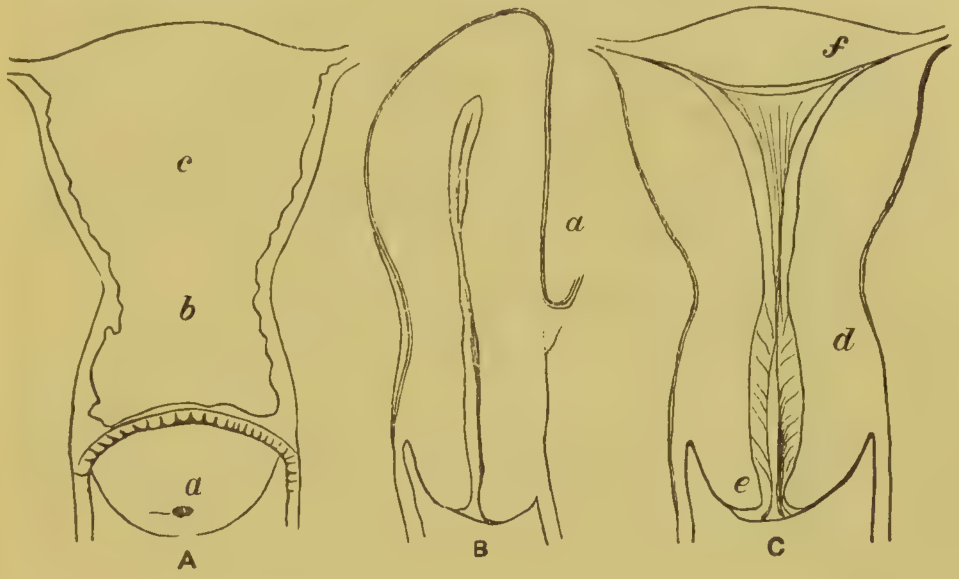


Fig. 13.

A. Virgin Uterus (front view) (Sappey). The Appendages and Vagina are cut away.
a Cervix (vaginal portion); *b* Isthmus; *c* Body; *a b* Cervix proper.
B. The same in vertical mesial section.
a is anterior surface, and lies just above where peritoneum passes on to bladder.
C. The same with cavity exposed by coronal section.
e Os Externum; *d* Os Internum; *f* Uterine Opening of Fallopian Tube. (1/1)

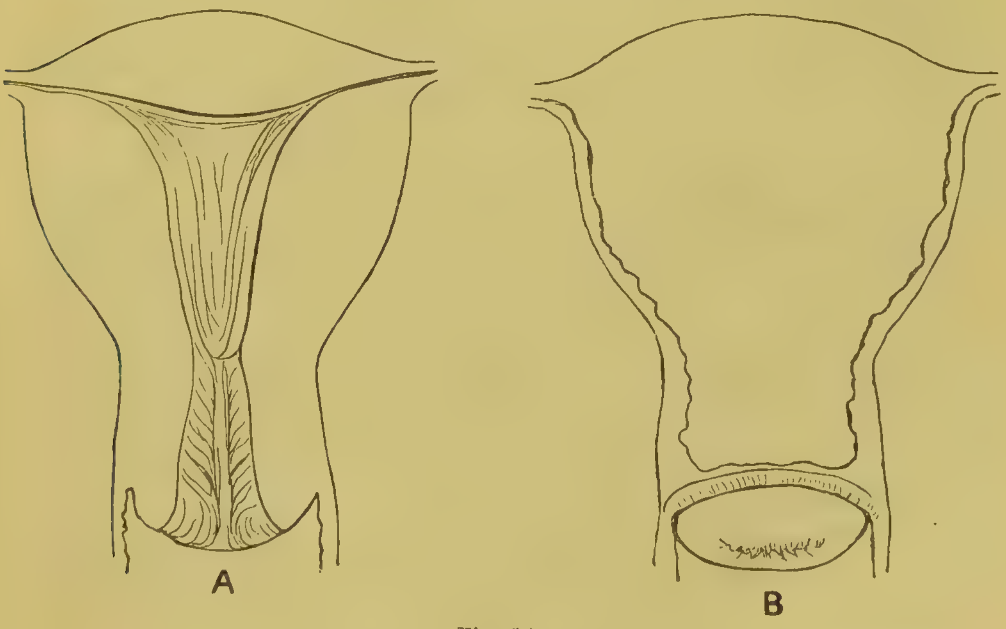


Fig. 14.

A Multiparous Uterus in coronal section to show cavity *B* Multiparous Uterus from front (Sappey). (1/1)

On external examination we find the parts known as the body (Fig. 13, *A*, *c*) and neck (Fig. 13, *A*, *a*, *b*). Keeping in mind the description of a triangle, we see the neck occupying the apex and the uterine orifices of the Fallopian tubes at the two other angles. Between the Fallopian tubes lies the fundus uteri. The anterior surface of the uterus is almost straight; the posterior, convex at its upper part, as is well seen in fig. 13, *B*. Where the body passes into the cervix there is a slight depression noticed on the posterior surface. This corresponds to the isthmus.

On making a vertical mesial section, we observe that the uterus is a hollow organ possessing a cavity with the anterior and posterior walls in apposition (Fig. 13, *B*). In order to see the cavity it is advisable to look at the uterus in coronal section, *i.e.*, a section which, passing through the cavity, divides the uterus into an anterior and posterior half, as shown in Fig. 13, *C*, Fig. 14, *A*. This latter section enables us more fully to understand the division of the uterus into body proper and cervix, and the division of the uterine cavity into cavity of the body proper and cervical cavity.

Cavity of Body.—This is a triangular slit in the uterus with the apex downwards, and with anterior and posterior walls. At each angle there is an opening, viz., at the lower angle we have the *os internum* opening into the cervical canal (Fig. 13, *C*, *d*), and at the upper angle the uterine openings of the Fallopian tubes (Fig. 13, *C*, *f*). The lining of the cavity is known as its mucous membrane.

Cavity of Cervical Canal.—This is spindle-shaped or conical (Fig. 13, *B*, *C*), and has two openings, viz., os internum above and os externum below. The former opens into the uterine cavity, the latter into the vagina.

The Cervix is divided into two portions, the vaginal and the supra-vaginal portion. The vaginal portion is within the vagina, and appears as a conical mass of the size and shape seen at Fig. 13, *A*, *a*. The os externum is in virgins a mere dimple, and feels to the examining finger like the tip of the nose. In women who have borne children it is transverse (Fig. 14, *B*) and in most cases has its lips fissured more or less deeply, and the mucous membrane of the cervical canal partially everted. The supra-vaginal portion is continuous with the body through the isthmus.

The length of the whole unimpregnated uterus is, speaking generally, about 3 inches; the length of the cavity of cervix and body about $2\frac{1}{2}$ inches.

	Virgin.	Nulliparae.	Multiparae.
Length of uterus	2·35 in.	2·50 in.	2·70 in.
Width	1·50 ,,	1·55 ,,	1·70 ,,
Thickness	0·85 ,,	0·90 ,,	1·00 ,,
			Sappey.
Vertical diameter of cavity	1·80 ,,		2·44 in.
Transverse ,, ,,	0·60 ,,		1·24 ,,
	("On Cadavera.")		*Richet.*

Length of entire organ in young women	5–6 cm.
Do. body of uterus	3–3·5 ,,
Do. cervix	2–3 ,,
Do. vaginal portion of cervix	·55– ·6 ,,
	Hennig.

Capacity of uterus in nulliparae = 2–3 c.cm.; in multiparae 3–5 c.cm. *Sappey.*

Various authors divide the cervix uteri more minutely as follows. They consider it as made up of—

a. an infravaginal portion;
b. an intermediate portion;
c. a supravaginal portion. (Fig. 15. *Schroeder*).

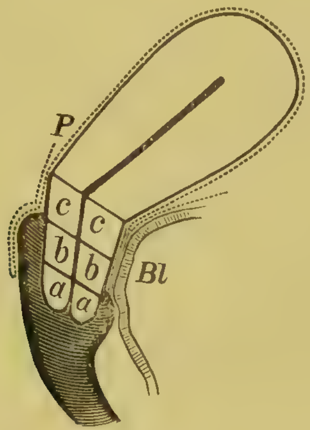


Fig. 15.

Diagram of Uterus to show divisions of Cervix (Schroeder).
a Infra vaginal portion; *b* intermediate portion; *c* supravaginal portion; *Bl* bladder; *P* peritoneum
The Dotted line shows Peritoneum.

Dr I. E. Taylor of New York speaks of—

1. The firm and true muscular element belonging to the body of the uterus solely, clearly, and distinctly;

2. The fibro-serous element existing between where the true muscular structure terminates, and the cervix uteri, the isthmus or intermediate part begins;

3. The glandular structure—the cervix proper.

These two views are of importance in relation to the causation of prolapsus uteri.

Transverse sections of the uterus at different levels are of different shapes (Figs. 16, 17, and 18). A consideration of what has been already said will make this clear.

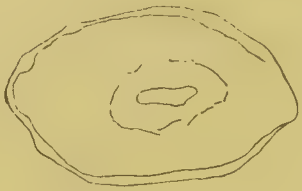


Fig. 16.
Diagram of Section of Uterus through centre of Cervical Canal (Farre). (½)

Recently the question of the boundary between the canal of the cervix and uterus proper has been raised afresh by Bandl and others in reference to pregnancy and parturition. Its discussion here would, however, bring in too much extraneous matter, and is therefore omitted, more especially as the whole question is still *sub lite.*

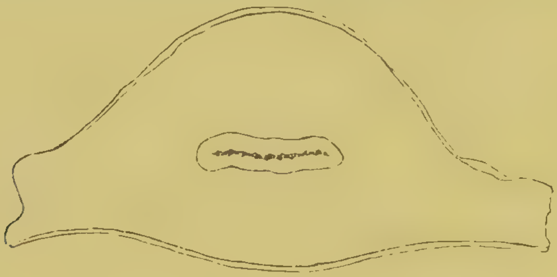


Fig. 17.
Transverse section through centre of cavity (Farre). (½)

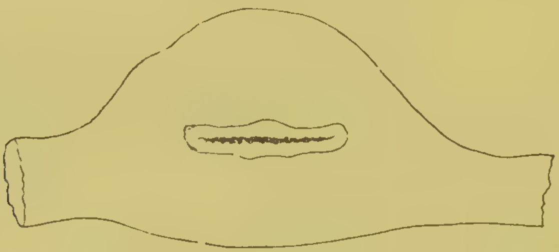


Fig. 18.
Transverse section of Uterus above Fallopian tubes (Farre). (½)

Structure of the Uterus.—If the uterus be viewed in vertical mesial section it will be seen to be made up of three distinct elements, viz., peritoneum, unstriped muscular fibre, and mucous membrane (Fig. 13, *B*). The peritoneum covers, partially, its external surface; the mucous membrane lines the cavity of the body and cervix; while the muscular fibre, by far the largest constituent, forms the tissue lying between these.

The Peritoneum of the Uterus clothes its posterior surface entirely (except the vaginal and middle portions of the cervix) but only dips down on the front surface as far as the isthmus, at which level it is reflected on to the bladder (Fig. 13, *B*, *a*). At the sides of the uterus the peritoneum on the anterior and posterior surfaces runs out to the wall of the pelvis, thus forming the important structures known as the broad ligaments.

The *Ligaments* of the uterus are—

Broad ligaments;
Round ligaments;
Utero-sacral and Utero-vesical.

The broad ligaments are described under the peritoneum. (See p. 38).

The round ligaments are two in number. According to Rainey, each springs by three fasciculi of tendinous fibres—the inner from the tendons of the internal oblique and transversalis, the middle from the superior column of the external abdominal ring near its upper part, and the outer fasciculus from just above Gimbernat's ligament. These unite into a rounded cord which crosses in front of the deep epigastric artery and passes between the layers of the broad ligament backwards, downwards, and inwards to the anterior and superior part of the uterus. Striped and unstriped muscle, bloodvessels, &c., are found in each.

The utero-sacral ligaments are peritoneal folds, two in number, enclosing connective tissue and unstriped muscular fibre, passing from the lower, lateral part of the body of the uterus outwards and backwards to the second sacral vertebra. They are known as the folds of Douglas, and form part of the upper, lateral boundaries of the pouch of Douglas. They are of the highest importance practically. The peritoneum, as it passes between uterus and bladder, constitutes the utero-vesical ligaments.

The *Musculature of the Unimpregnated Uterus* is of little importance in Gynecology, and needs only a passing notice. Three coats are described:—a thin subperitoneal coat passing into the round ligaments, broad ligaments, utero-sacral and utero-vesical ligaments; a middle coat; and an inner concentric and very abundant layer which surrounds the Fallopian tubes, os externum, and os internum. The student should not forget that the arrangement of the muscular fibres is of the highest importance in practical obstetrics.

The *Mucous Membrane* of the cavity of the body of the uterus is a thin reddish-gray layer, about 1 cm. (·04 inch) thick in the unimpregnated but fully developed organ. It is set on the inner aspect of the muscular layer of the uterus without the intervention of any submucous layer, is made up of ciliated columnar epithelium on a basis of connective tissue and has numerous glands—the utricular glands. On

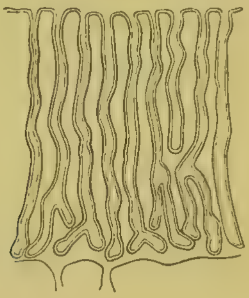


Fig. 19.
Diagram of course of Glands of Mucous Membrane of Uterus (Engelmann). ($\frac{4}{1}$)

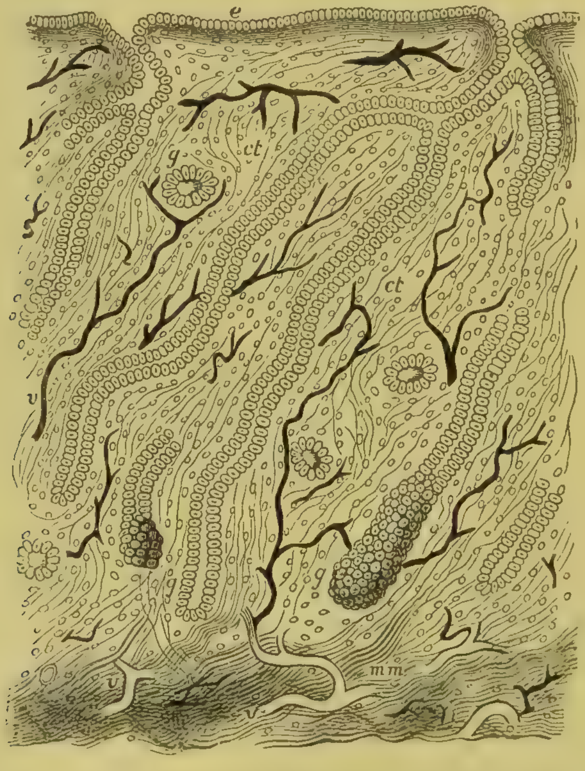


Fig. 20.
Vertical Section, through the Mucous Membrane of the Human Uterus. (Turner.)
e Columnar Epithelium, the Cilia are not represented; *gg* Utricular Glands; *ct*, *ct* Interglandular Connective Tissue; *vv* Bloodvessels; *mm* Muscularis Mucosae. (450.)

section and microscopic examination, the glands, lined by the ciliated epithelium, can be seen coursing down obliquely from the free surface and ending at the muscular fibre. Fig. 19 shows them perpendicular, but this is less correct, as Turner's diagram indicates (fig. 20). The glands usually bifurcate at their lower ends, and two may have a common mouth. The innermost layer of muscular fibre sends up prolongations between them—muscularis mucosae.

The connective tissue in which the glands are imbedded consists of delicate round and spindle-shaped cells, the former being more abundant near the surface, the latter deeper. Fibrillated bundles of connective tissue lie also between the cells and pass out between the muscular fibre of the uterine wall (fig 20).

The *mucous membrane* lining the cervix is different in arrangement and structure from that lining the cavity of the uterus. It is thrown into numerous folds presenting to the naked eye the appearance known as the arbor vitae, which consists of a longitudinal mesial ridge on the anterior and posterior walls, from both sides of which secondary ridges branch off obliquely. It is lined throughout with a single layer of epithelium (fig. 21) which is ciliated on the elevated portion of the ridges but is columnar in the depressed portions (de Sinéty).

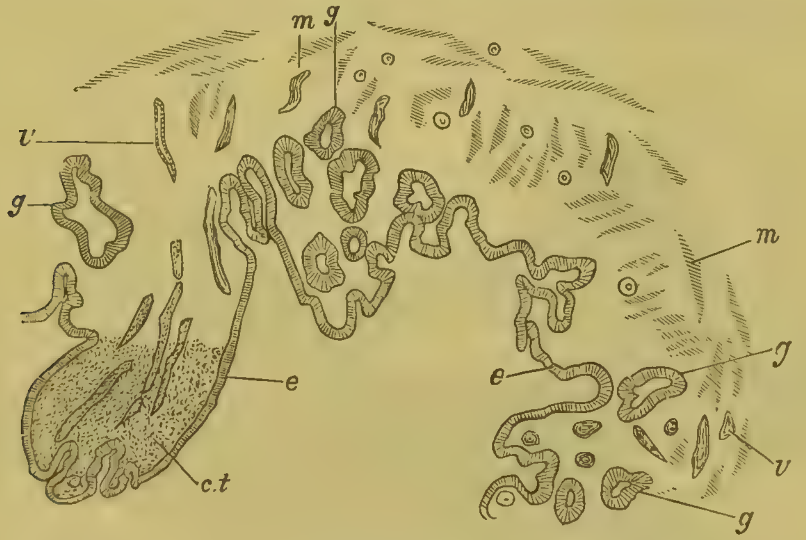


Fig. 21.
Mucous Membrane of Cervix in Microscopical Section (de Sinéty).
e ciliated columnar epithelium, cilia not shown; *g* glands; *m* muscular fibre; *v* bloodvessels; *ct* connective tissue shown only at one part of figure. ($\frac{40}{1}$)

The glands are of the racemose type; and consist of elongated repeatedly-branching ducts which extend deeply into the connective tissue and are somewhat dilated at their extremities (Ruge and Veit). They open on the ridges and furrows of the mucous membrane.

There is a sharp line of demarcation between this single layer of epithelium (columnar and ciliated) which lines the cervical canal and the epithelial covering of the external surface of the vaginal portion, and this line of demarcation corresponds in the adult to the os externum. Beyond the os externum the epithelial covering has all the characters of skin; it consists of vascular papillae covered with many layers of squamous epithelium. The vascular papillae are not easily recognised without the help of reagents (Ruge and Veit). The epithelial cells are like those found in the skin and dovetail into one another by denticulate edges (de Sinéty).

It is a disputed question whether glands are present on the vaginal aspect of the normal cervix. De Sinéty says he has never met with them except in the neighbourhood of the os externum, and their occurrence there he attributes to an eversion of the mucous membrane of the canal. Ruge and Veit also consider the existence of glands as a pathological condition which is however easily induced.

The normal histology of the cervix uteri has an important bearing on the pathology of the so-called ulcerations and on laceration of the cervix and ectropium.

FALLOPIAN TUBES.

The *Fallopian tubes* are two tubes, one on each side of the uterus,

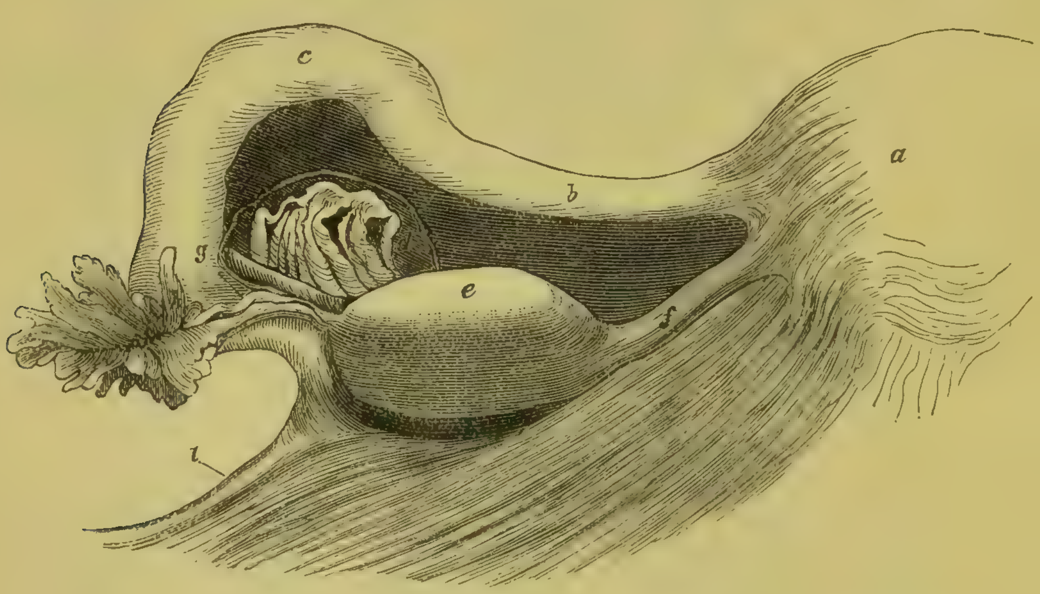


Fig. 22.

View from behind of the lateral angle of the Uterus, with part of the Left Broad Ligament, Fallopian Tube, Ovary, and Parovarium (Henle).
a Uterus; *b* Isthmus of Fallopian Tube; *c* Ampulla; *g* has Parovarium to the right, and Fimbriated end of Fallopian Tube and Ovarian Fimbria just below it; *e* Ovary; *f* Ovarian Ligament; *i* Infundibulo Pelvic Ligament. (½)

running sinuously from its upper angles out towards the side of the pelvis (Figs. 22 and 53). They lie enclosed in the upper free margin of the broad ligaments, and vary in length from 10 to 16 cm. (3 to 4 inches). They are not of equal length, the right being frequently longer than the left.

After leaving the superior angle of the uterus, the course of the tube is straight for about 2½ centimetres (1 inch). It then curves outwards and forwards, and finally backwards and inwards, so that the whole tube has roughly the shape of a shepherd's crook (Fig. 22). Three parts come up for consideration—the isthmus, the ampulla, and the pavilion or fimbriated end.

The *isthmus* is the straight narrow part of the tube (fig. 22, *b*), which at its internal end opens into the uterine cavity, and has a lumen barely admitting a bristle. On transverse section the diameter of the whole thickness is about 2 to 3 mm.

The *ampulla* is the curved and thick part of the tube (fig. 22, *c*), having an average diameter of about 6-8 mm., with a lumen admitting the ordinary uterine sound.

The free *fimbriated end* of the Fallopian tube (pavilion) is expanded and funnel-shaped; and it is provided with primary and secondary fimbriae surrounding the opening of the tube to which they converge. One special fimbria runs to the ovary (Fig. 22).

On section the Fallopian tube is seen to be made up of three layers from without inwards, viz., peritoneal, longitudinal and circular unstriped muscular fibres (the latter being inner), and mucous membrane lined with ciliated columnar epithelium. Connective tissue and elastic fibres lie between the peritoneal and muscular layers. No glands exist in the mucous membrane, which is much folded in a longitudinal direction especially in the ampulla.

It is remarkable that the ciliated epithelium lining the Fallopian tube and pavilion should be continuous with the squamous epithelium of the peritoneum; and that, further, there is direct continuity between the vagina, uterus, fallopian tubes and peritoneum,—so that the peritoneal sac in the female is not closed as in the male.

Parovarium or Organ of Rosenmüller.—If the broad ligament be held between the light and the observer's eye, this rudimentary structure will be seen enclosed in its folds in the space between the ovary and ampulla (Fig. 22, *d*). It consists of closed tubules lined with ciliated epithelium, which converge towards the ovary and are united by a longitudinal tube [*v.* under Development]. Their pathological degeneration produces the cystic tumours known as parovarian.

OVARIES.

The ovaries, two in number, lie one on each side of the uterus, projecting markedly through the posterior layer of the broad ligament.

Form, Size, and Relations.—The ovary is a small oval-shaped body about the size of a walnut, the weight of which varies from 60 to 135 grains. According to Farre its measurements are as follows :—

	Longitudinal Diameter.	Transverse Diameter.	Perpendicular Diameter.
Greatest . . .	2 in.	$1\frac{1}{12}$ in.	$\frac{1}{2}$ in.
Smallest . . .	1 in.	$\frac{1}{2}$ in.	$\frac{1}{4}$ in.
Average . . .	$1\frac{1}{3}$ in.	$\frac{3}{4}$ in.	$\frac{3}{8}$ in.

The ovary has an anterior and posterior border, and an upper and lower surface. The posterior border is convex and free, the anterior flattened and attached to the broad ligament. It should be noted that this anterior border is called the hilus, and that the blood vessels and nerves enter there.

The position of the ovary will be discussed afterwards (p. 52), but at present it is sufficient to consider it as lying behind the broad ligament with its posterior border looking backwards and its outer end farther back than its uterine one.

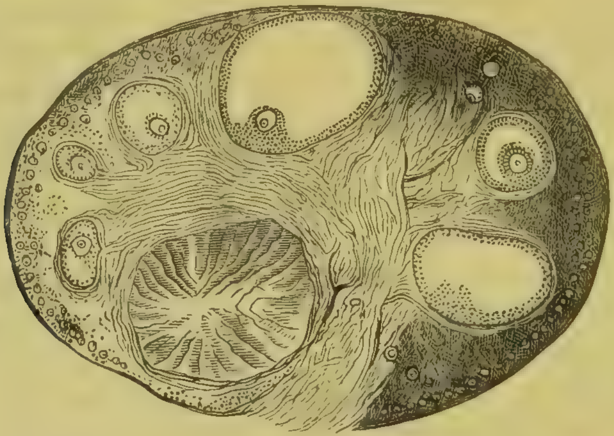


Fig. 23.

Section of Cat's Ovary (Schrōn). The free border of the ovary is, in the fig., above; the base of attachment—hilus—below. The division into Cortical and Medullary Layers is indicated. Note smallest Graafian Follicles at surface, and larger ones not so superficial. A Corpus Luteum lies to the left of the hilus. ($\frac{4}{1}$)

Ligaments of the Ovary.—In addition to the attachment which the broad ligament gives to the ovary, two important ligaments are described—the ovarian ligament and the infundibulo-pelvic ligament.

The *Ovarian Ligament* (fig. 22, *f*) is about 3 cm. (1 inch) long, and extends from the inner end of the ovary to the corresponding upper angle of the uterus, just below the uterine origin of the Fallopian tube. It is a longitudinal fold of the peritoneum into which the unstriped muscular fibre of the uterus is prolonged.

The *Infundibulo-Pelvic ligament* (fig. 22, *i*) is about 2 cm. long, and runs from the outer end of the Fallopian tube to the side wall of the pelvis. It is simply that part of the upper margin of the broad ligament unoccupied by Fallopian tube.

The *Ovarian Fimbria* (fig. 22, *i*) prevents the separation of the ovary and infundibulum tubæ. Thus the ovary is kept in position by its attachment to the broad ligament, by the ovarian and by the infundibulo-pelvic ligaments. Its own specific gravity has also a share, *i.e.*, the ovary floats at a certain level.

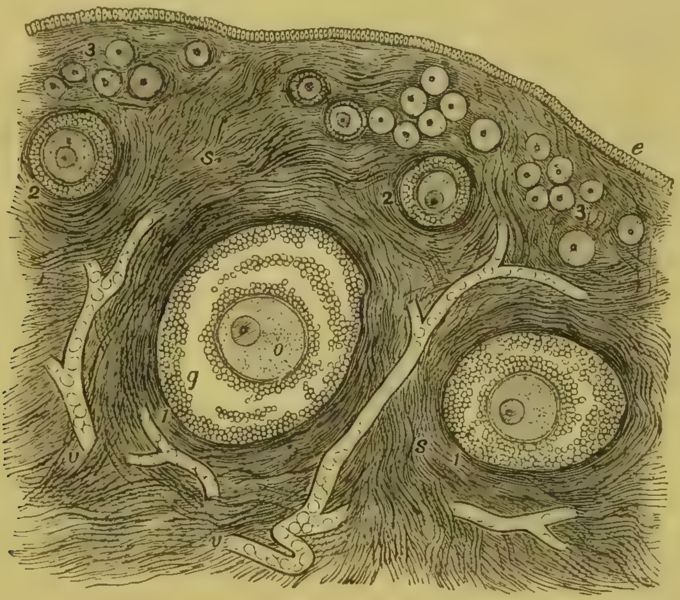


Fig. 24.

Section through the Cortical part of the Ovary (Turner).
e Germ Epithelium; *ss* Ovarian Stroma; 1, 1 large-sized Ovarian Follicles; 2, 2 middle-sized; and 3, 3 smaller-sized Graafian Follicles; *o* Ovum within Graafian Follicles; *v*, *v* Bloodvessels in the Stroma; *g* Cells of Membrana Granulosa.

Structure of the Ovary.—The ovary is covered by epithelium differing from the squamous epithelium of the peritoneum in being made up of columnar cells with a dull lustre. It is continuous, however, with the peritoneal epithelium, the line of contact being marked by a whitish and elevated line. The epithelium covering the ovary is known as the germ-epithelium. This distinctive term is of importance in connection with the development of the ova and will be more particularly alluded to afterwards.

On section and microscopical examination, the ovary is found to consist of connective tissue with the structures known as the Graafian follicles embedded in it, along with bloodvessels, nerves, lymphatics, and some unstriped muscular fibre. These are enclosed in the epithelial covering already described. The connective tissue is divided into a cortical and medullary layer; the former lying beneath the peritoneum, the latter being at and near the hilus (Fig. 23). The medullary layer is very vascular, and has some unstriped muscular fibre round the branches of the ovarian artery (Fig. 24).

The Graafian follicles are scattered through the whole substance of the ovary. The following points should be carefully noted.

a. The younger and smaller Graafian follicles lie in the cortical layer. Their size is generally about $\frac{1}{100}$th in., and they exist in immense numbers. According to careful estimates, the ovary of a female infant may contain 40,000 to 70,000 such follicles.

b. The larger follicles are much fewer in number and lie deeper in the ovary. Size $\frac{1}{30}$th to $\frac{1}{100}$th in.

c. There are also still larger follicles nearer the surface than the latter. These have advanced from the deeper layer (*vide* under Menstruation).

Structure of a Graafian Follicle.—This consists of

1. An envelope of connective tissue with capillary vessels;
2. The Membrana granulosa, a layer of nucleated columnar epithelial cells forming the discus proligerus at one part;
3. Fluid.

The ovum (size $\frac{1}{100}$ to $\frac{1}{130}$ in. diameter) lies in the discus proligerus; it has

1. External envelope—zona pellucida,
2. Yelk protoplasm,
3. Germinal vesicle ($\frac{1}{700}$th in. diameter),
4. Germinal spot $\frac{1}{3000}$th in. diameter.

THE VAGINA.

The vagina is a mucous slit in the pelvic floor, extending from the hymen to the cervix uteri, and lying between the urethra and bladder in front and the rectum behind. In the upright posture it makes an angle of about 60° with the horizon, *i.e.*, it is nearly parallel to the pelvic brim.

The vagina has two walls, an anterior and posterior, which are continuous at their sides. The anterior vaginal wall is triangular in shape, the base being above. Its lower limit is marked out by the hymen. At its upper end it is reflected down to a very small extent on the anterior lip of the cervix uteri, the anterior fornix being thus formed (Fig. 25). It is closely incorporated with the urethra, but between it and the posterior aspect of the bladder there is loose connective tissue. Its length is about 5 cm., *i.e.*, 2–2½ inches.

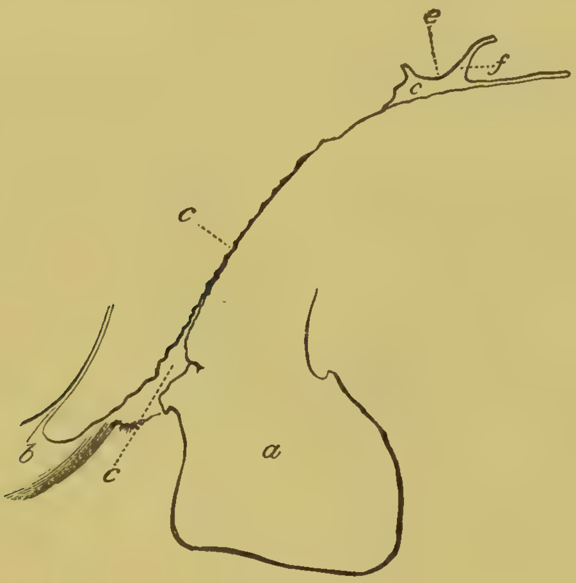


Fig. 25.

Life-size drawing of Vagina in vertical section (Hart.)
a Perineum; *b* Urethra; *c* Vagina; *e* Anterior Lip of Cervix; *f* Os Uteri. The axis is not normal in its upper part, as the Uterus was drawn back. ($\frac{1}{1}$)

The mucous membrane of the wall is arranged in folds roughly transverse. At its lower end is a vertical mesial single or double thickening of the mucous membrane, about 2 cm. long, known as the anterior vaginal column (fig. 26, *b*). This begins near the urethral orifice or about 1½ cm. above it. According to Budin, the columns are prolonged on the hymen.

The posterior vaginal wall is triangular in shape and extends from the vaginal orifice upwards to the cervix uteri upon which it is reflected, thus forming the posterior fornix vaginae, which is deeper than the anterior one. Its length is about 7½ cm. (3 inches), *i.e.*, about 2½ cm. (nearly 1 inch) longer than the anterior. It is also transversely rugous, and has a posterior column analogous to the anterior but smaller.

While the direction of the anterior vaginal wall is almost straight, that of the posterior vaginal wall is sigmoid (Fig. 27). The curve varies, however, according to the position of the uterus, and the fulness or emptiness of the adjacent bladder and rectum.

When the bladder and rectum are empty we find the direction of the vagina parallel to the pelvic brim. When the bladder is distended the vagina is, chiefly at its upper part, driven nearer the sacrum; while if the rectum be distended, the vaginal axis may be almost perpendicular.

Structure of Vagina.—The vaginal wall on section and microscopical examination is found to consist of mucous membrane, made up of epithelium (the superficial layer being squamous and nucleated, the deeper layer cylindrical and with elongated nuclei); of connective tissue, elastic tissue, and some unstriped muscular fibre. External to this lie two layers of unstriped muscular fibre; the inner longitudinal, the outer circular (Henle). Breisky alleges the inner to be circular. There are no proper glands in the vagina, but gland-like crypts and lymph follicles exist (Löwenstein) (fig. 29). The whole is surrounded by loose connective tissue (fig. 29).

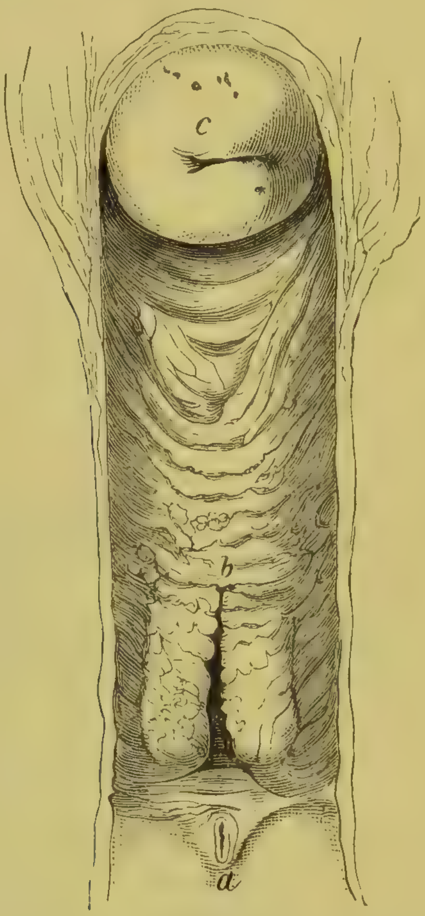


Fig. 26.

Anterior Vaginal Wall and Multiparous Cervix, looked at from behind (Henle). *a* Urethral Orifice; *b* Anterior Vaginal Column; *c* Cervix Uteri. ($\frac{1}{1}$)

As already said, the vagina is a mere slit in the pelvic floor, although it is often erroneously described as a tube or cavity. On vertical section, as Fig. 25 shows, it appears as a mere linear slit; while on transverse section it is H-shaped, or crescentic (figs. 28 and 46). Of course the vagina is eminently dilatable and its walls separable, as will be more fully considered under the structural anatomy

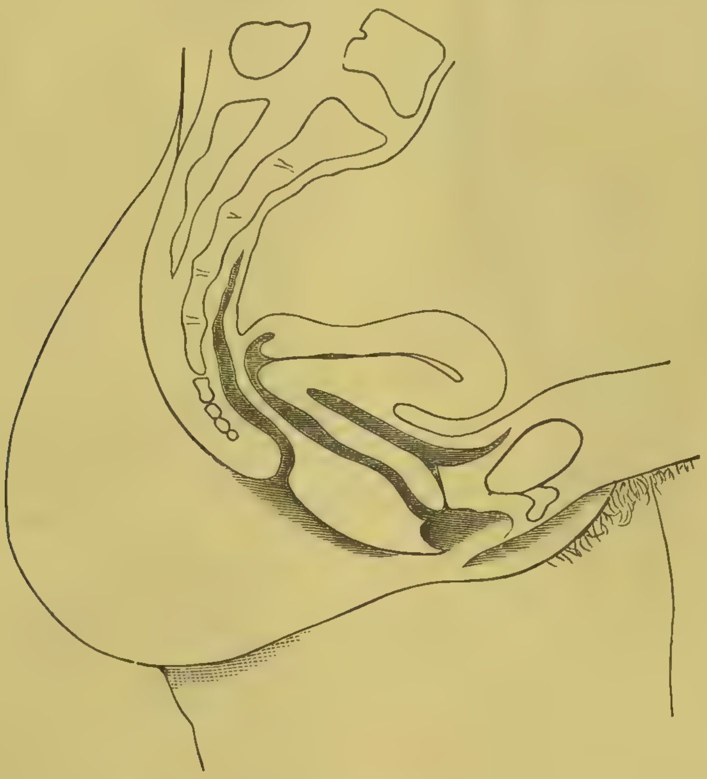


Fig. 27.
Diagram of Vertical Mesial section of Female Pelvis, showing Sigmoid curve of posterior Vaginal Wall (Schultze). (¼)

of the pelvic floor, but this dilatation or separation is the result of posture with manipulation, or of Parturition. Whatever posture a woman may assume, the vagina on section is slit-like, unless in certain exceptional instances.

THE BLADDER.

Position.—The empty female bladder lies behind the pubis and in front of the vagina, and consists of the urethra and bladder proper.

The urethra is a straight slit (some describe it as sigmoid) about 1⅜ inches long, with thick walls closely incorporated with the anterior vaginal wall behind. It runs parallel to the plane of the pelvic brim. Its lower opening is known as the meatus urinarius, the position of which has been already considered in the section on the External Genitals; its upper opening is at the neck of the bladder. On section and microscopical examination, its mucous membrane is found covered with squamous epithelium in its lower part; while higher up it is like that of the bladder, and is very rich in elastic fibres. There is a double layer of *unstriped* muscular fibre, the longitudinal layer being internal and the circular outside; and, according to Uffelman, a circular (inner) and longitudinal layer of *striped* muscle, which stretches from the neck of the bladder to within $1\frac{1}{2}$ cm. of the meatus urinarius. Luschka also describes a special sphincter of the vaginal and urethral orifices. It should be further noted that the mucous membrane is folded longitudinally and contains mucous glands lined

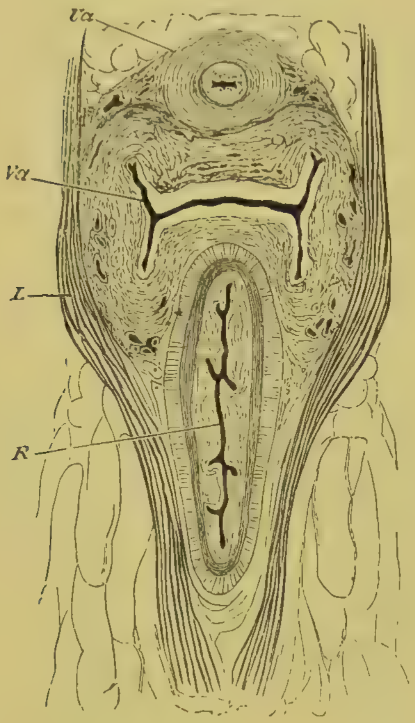


Fig. 28.

Horizontal section of the Pelvic Floor at the Pelvic Outlet (Henle).
Ua Urethra; *Va* Vagina; *R* Rectum; *L* Levator Ani.

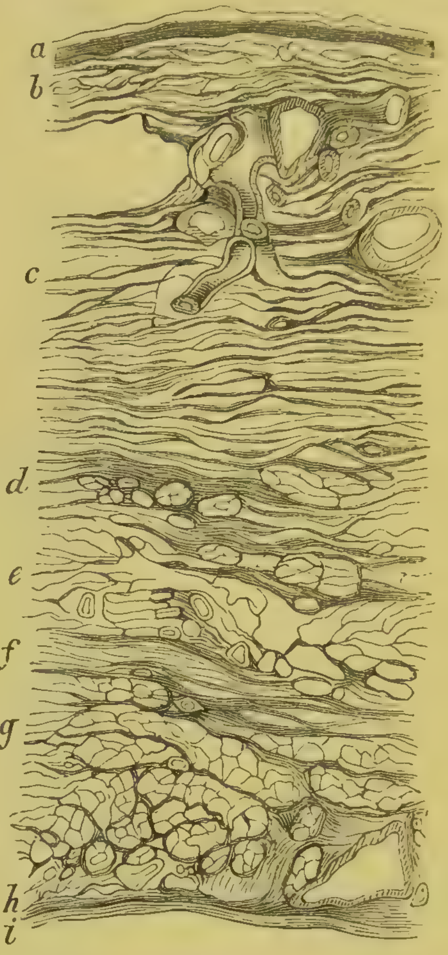


Fig. 29.

Horizontal section of the posterior wall of Bladder and the anterior wall of the Vagina (Henle). ($\frac{15}{1}$)
a Epithelium of the Bladder; *b* Mucosa; *c* layer of circular fibres; *d* layer of longitudinal fibres; *e* Loose Tissue; *f* layer of circular fibres; *g* layer of Longitudinal fibres; *h* Mucosa; *i* Epithelium of Vagina.

with cylindrical epithelium, papillae and lacunae, and also villous tufts near the meatus; and that there is a submucous layer between the mucous membrane and unstriped muscle, containing many veins. Re-

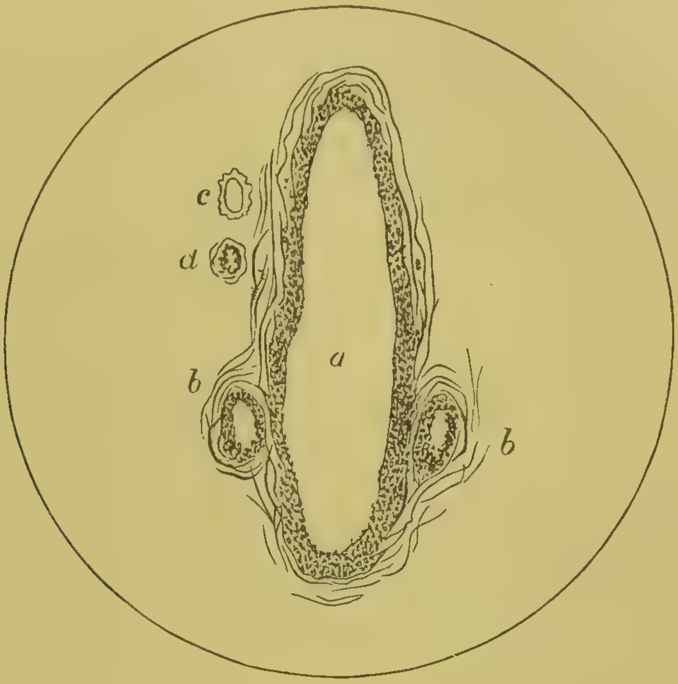


Fig. 30.
Transverse section of urethra much enlarged (Skene).
a Urethra; *b b* Glands described by Skene; *c* Vein; *d* Artery.

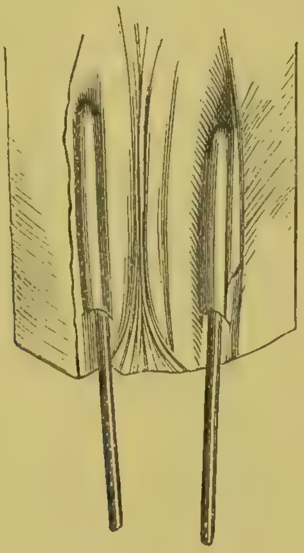


Fig. 31.
Urethra laid open from above, shewing glands with probes passed in (Skene).

cently Skene, of New York, has described two tubules in the female urethra. They lie on each side "near the floor of the female urethra, and extend up from the meatus urinarius for about $\frac{3}{4}$ inch (Figs. 30 and 31). They lie beneath the mucous membrane, and in the muscular walls of the urethra." We have in section of the female urethra :—

mucous membrane ;
submucous layer ;
muscular layer, longitudinal and circular, unstriped ;
do. do. striped (Uffelman).

External to these there is the anterior vaginal wall behind, and loose tissue in front.

According to Henle, the closed urethral slit is on section transverse near the bladder, sagittal at the meatus, and star-shaped between these two points.

In the bladder proper we have three openings, the internal orifice of the urethra and the orifices of the two ureters. The latter lie one on each side, about $1\frac{1}{2}$ inches from the internal orifice. These openings give us the landmarks for the division of the bladder into neck, base, and body. All above the lines joining the ureteric openings and the centre of the symphysis is the body ; all below is the base, and that portion between the ureteric openings and the internal orifice is the trigone. Just above the ureters is the *bas fond.* (Skene)

The wall of the bladder is made up of three layers, *viz.*, a mucous, a muscular, and a peritoneal.

The mucous membrane consists of connective tissue lined by several layers of transitional or multiform epithelium (Fig. 32). It is arranged in folds, except over the trigone and openings. The folds or rugae are due to the laxity of the submucous coat.

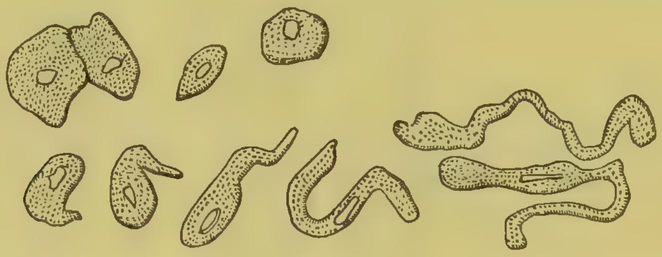


Fig. 32.

Epithelial cells from the mucous membrane of the bladder. Those in the upper row are the superficial squamous cells; those in the lower row are the peculiar cells of the middle stratum (Turner).

The muscular coat of the bladder is of the unstriped variety, and has a complicated arrangement. There are external longitudinal fibres, circular fibres within these, and an internal longitudinal layer on which rests the submucous coat. It is disputed whether there is a sphincter at the neck of the bladder. Probably there is not; but the puckering of the mucous membrane at the neck is alleged to have a valve-like function.

The peritoneal covering of the bladder will be considered subsequently.

The relation of the ureters to the bladder is of importance. Garriguez has recently investigated this subject owing to its importance in Gastro-Elytrotomy.

In this obstetric operation, employed in cases where craniotomy or the cæsarean section is the alternative, the operator cuts through the abdominal walls with the same incision as that for ligature of the external iliac artery. The peritoneum is pushed aside and the vagina partly cut and partly torn by an oblique incision. The child is then extracted. In some of the cases the bladder or ureter has been torn into.

According to him "the ureter does not lie in the broad ligaments, it does not keep the same direction on reaching the wall of the bladder, and it does *not* lie close up to the wall of the cervix, all of which is taught by anatomical authorities. After having crossed the iliac vessels the ureters diverge, running downward, backward, and a little outward on the wall of the pelvis, behind the broad ligaments to a point near the *spina ischii.* Then they bend downward, forward, and considerably inward so as to converge toward the bladder. They pass beneath the

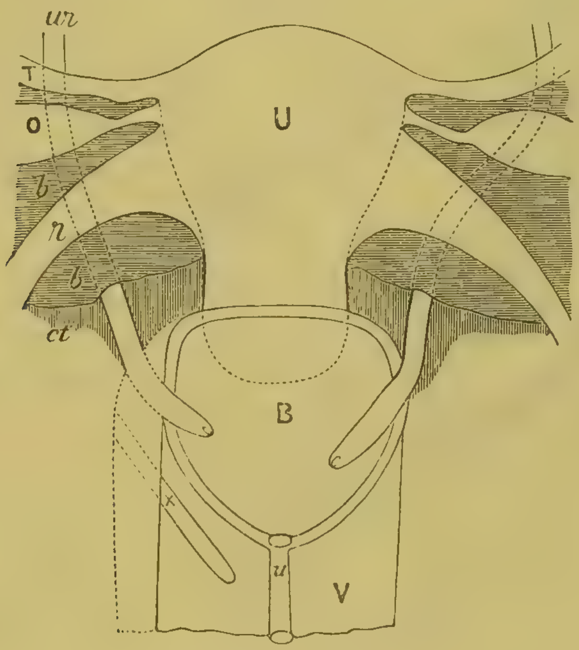


Fig. 33.

Relations of ureters (Garriguez.)

U Uterus; *ur* Ureter; *B* Bladder; *u* Urethra; *V* Vagina; *T* Fallopian tube; *O* Ovary; *b* Broad ligament; *r* Round ligament; *ct* Connective tissue; *x* Incision of Vagina in Gastro-elytrotomy. ($\frac{2}{3}$)

base of the broad ligament, lying in the abundant cellular tissue found in this locality. They cross the cervix at some distance from behind, at an acute angle, so as to come in front of and below it. They lie outside and above the anterior part of the side wall of the vagina, on a spot as large as the tip of the finger. On reaching the wall of the bladder they turn rather sharply inward and go less downward until they open with a small slit into the interior of the bladder at the outer angle of the *trigonum vesicæ*. But on dissecting the bladder from the uterus and vagina, their substance is seen to continue running as a solid ridge between the two apertures, and forming the base of the trigone (Jurie's interureteric ligament)." (See Fig. 33).

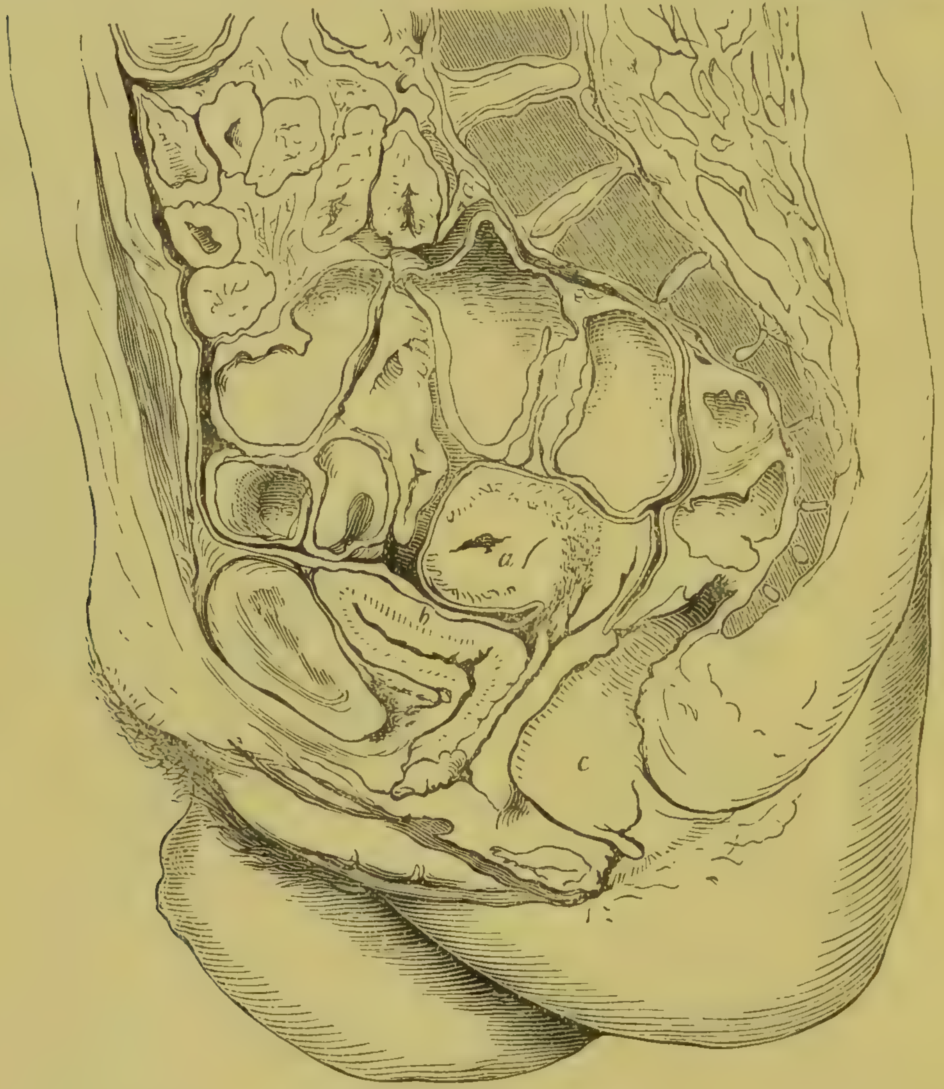


Fig. 34.

Vertical mesial section of Female Pelvis, shewing Y shape of Bladder (Fürst). (½)

Shape of empty bladder and changes in its position.—The empty female bladder lies completely behind the pubis, and has its fundus covered by peritoneum. When empty and viewed in mesial section it may present one of two shapes. In the large majority of specimens figured, it forms with the urethra a Y shape on sagittal mesial section. The oblique legs of the Y may be about equal in size, or the posterior may be shorter (Figs. 40, 34). This form is so common that it has been accepted hitherto by all authors as the normal one. In certain cases, however, insignificant in number as compared with the former, the empty bladder cavity forms with the urethra a continuous tube on vertical mesial section (Fig. 35). In such cases, it is oval in shape, corrugated, and firm to the touch. This latter shape is the one always found in the lower animals, such as the rabbit and dog, and is the only one seen in the human fœtus. If, therefore, the pelvic floor of a woman be viewed on its peritoneal aspect, the fundus of the empty bladder will be found to be almost always large and concave, while in a few cases it is small and convex. In the former case, the inner surface of the upper segment of the bladder, large in area, is in contact with the surface of the lower segment; in the latter, the anterior and posterior inner walls, small in area, touch one another.

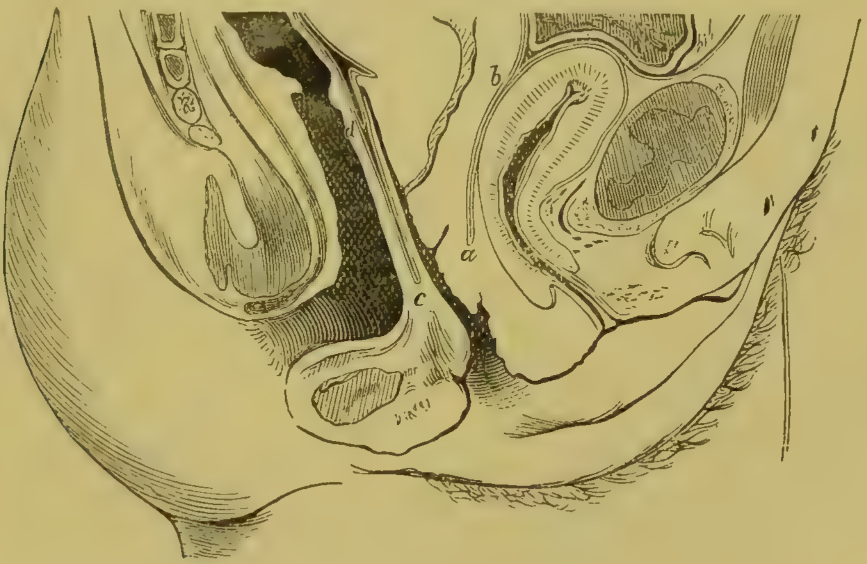


Fig. 35.

Vertical mesial section of Female Pelvic Floor, shewing contracted bladder in a suicide (Braune). (½) The peritoneum descends in front of the uterus to *b* and behind it to *d*; *b a* and *d c* are loose extra-peritoneal tissue.

It is probable that when the bladder has the Y shape on section, it is in diastole (Fig. 34); and when the oval shape (Fig. 35), it has been caught in systole. The bladder contracts to expel the urine and then relaxes. Between the acts of urination the bladder is therefore only a flaccid sac. Some additional facts as to the position and distention of the bladder are best considered further on, under the structural anatomy of the pelvic floor. We may here state, however, that (1) when empty, in the non-parturient female, it is behind the pubis (Fig. 32); (2) it is drawn above the pubis in the parturient female; (3) it is tilted above the pubis in retroversion of the gravid uterus.

The so-called ligaments of the bladder are false and true. The false are formed of peritoneum and will be considered under the peritoneum of the pelvic floor. The true ligaments are formed of the pelvic fascia.

RECTUM.

The *Rectum* extends from the left sacroiliac synchondrosis, where the sigmoid flexure of the colon terminates, to the anus. It curves downwards, backwards, and inwards, to about the third sacral vertebra. This

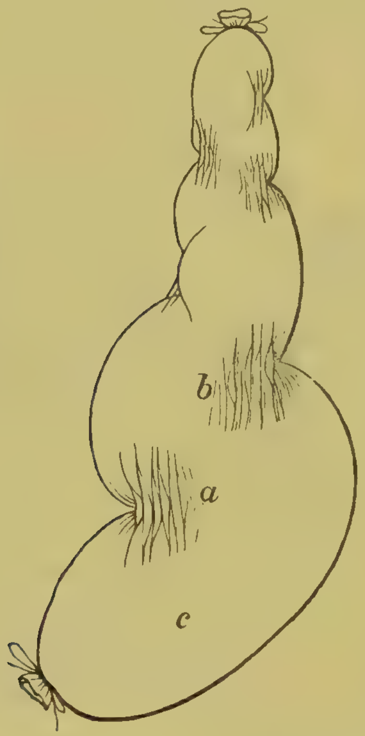


Fig. 36.

Rectum inflated (Chadwick).
a b Sphincter tertius; *c* Ampulla of Rectum.

is known as the first part of the rectum; it is completely covered by peritoneum, which forms the mesorectum. The peritoneum is reflected from the rectum on to the upper part of the vaginal wall, about 3 inches above the vaginal orifice. Thereafter, the rectum lies in relation anteriorly to the posterior vaginal wall to which it is loosely attached until about 1½ inches from the anus.

The rectum is made up of peritoneal investment; unstriped muscular fibre in two layers, longitudinal and circular, the former being the outer; a submucous coat; and a mucous lining with its musculares mucosae, columnar epithelium, no villi, but with Lieberkuhnian follicles closely set together. At the upper limit of the anus, the circular fibres are very well marked and constitute the sphincter ani internus (fig. 37).

Certain oblique folds in the rectum—consisting of mucous, submucous, and circular unstriped muscular coats—are of special interest. One exists 1½ inches from the anus, another is near the sacral promontory, and one is intermediate (Turner). The lowest (the valve of Houston or sphincter ani tertius of Hyrtl) has been described by Chadwick of Boston, as being not an entire circular fold but made up of two semicircular constrictions, one on the anterior wall and one on the posterior an inch higher up (Fig. 36).

The *Anus* is that part of the rectum at its external orifice. It is about an inch long, and has its long axis directed backwards and cutting the axis of the vagina at about a right angle. The rectum, therefore, when in contact with the posterior vaginal wall, closely follows its direction but at about 1 inch from the anus turns sharply backwards. There is thus left between it and the last 1½ inch or so of the posterior vaginal wall, an angular inter-space to be filled up by the structure known as the perineal body.

Fig. 37, from Ruedinger, shews the arrangement of the voluntary and involuntary muscle of the anus. The division of the external sphincter into two parts, and the separation of the lower division (5) into compartments by fibres from the longitudinal unstriped layer (9), are noteworthy. Similarly the internal sphincter (7) is divided into compartments by fibres from the muscularis mucosae (13). Near the anal orifice the mucous membrane has certain perpendicular folds in it known as the Columnae Morgagni, with depressions between these—the Sinus Morgagni (fig 2).

PERINEAL BODY.

The posterior vaginal wall is in contact with the anterior rectal wall, for about 1½ inches above the apex of the perineal body, there being only loose tissue between. The anus has its long axis directed backwards, while the vaginal axis runs forwards; we thus get a pyramidal space filled up by the structure known as the Perineal body (Henle and Savage).

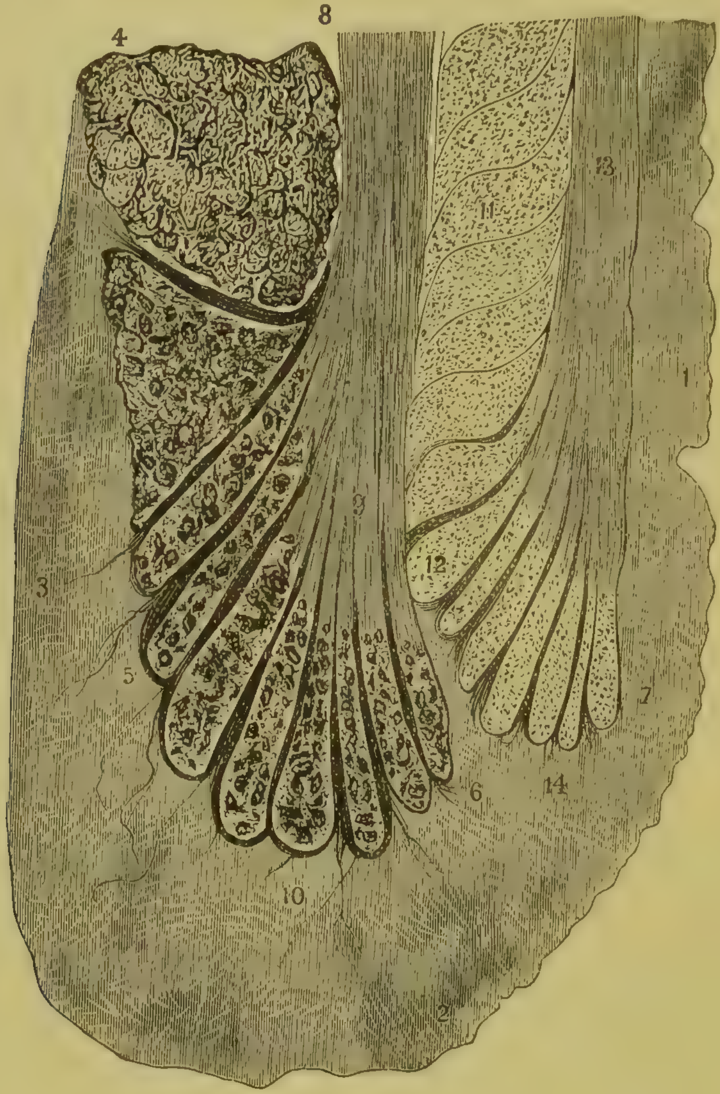


Fig. 37.

Perpendicular section through the end of the Rectum enlarged (Ruedinger).
1 Mucous Membrane of the Rectum; 2 boundary between Mucous Membrane and skin of buttock; 3 Fat; 4 Levator Ani; 5 Sphincter Ani externus; 9 Fibres of Longitudinal Layer separating external sphincter into parts; 7 Sphincter ani internus; 8 Longitudinal Fibres of muscular coat, which radiate outwards at 9; 13 Longitudinal Fibres of Muscularis mucosae which radiate outwards at 12: 11 Circular Fibres of muscular coat; 6, 10, and 14 Slips of muscular fibre passing into tissue beyond.

The Perineal body is made up of muscular insertions and origins (striped and unstriped), and fibrous and elastic tissue. Its base is covered by the skin lying between the anus and vagina; its anterior side is behind the posterior vaginal wall; its posterior side lies in front of the anterior rectal wall and anus; while laterally, it is bounded by fat. The voluntary muscles passing into it are the Sphincter-ani, Transversus perinei, Bulbo-cavernosus, and Levator-ani (fig. 2).

This Perineal body measures about 1½ inches (4 cm.) vertically, the same transversely, and ¾ in. anteroposteriorly. If a straight line be made to join the tip of the coccyx and the subpubic ligament, it will just clear the apex of this structure.

Its functions are important, but have been both exaggerated and underrated. It gives a fixed point for many muscles, prevents pouching of the rectum forwards, and strengthens that part of the pelvic floor which has no posterior bony support.

Its special significance, however, will be considered further on.

At present, the nomenclature in regard to the "Perineal region" is exceedingly vague; as the term Perineum is used in varying senses by accoucheurs, especially in regard to the tears caused by Parturition. It is better to be precise, and speak of tears of the hymen, fourchette, and perineal body, instead of saying "perineal tears." The surface between the anal and vaginal orifices is not the perineum, but the "skin over the base of the perineal body" and "the fourchette."

PERITONEUM.

This is the thin serous covering of the concave surface of the pelvic floor, uterus and its appendages, &c. A knowledge of its disposition is of the highest importance to the Gynecologist. This is best considered as follows.

1. *The Pelvic Peritoneum as followed in the Vertical Mesial Line.*—The Peritoneum of the anterior abdominal wall is reflected, at a point a little above the symphysis pubis, on to the fundus of the empty bladder (figs. 38 and 39). It passes downwards over the posterior surface of the bladder, from which it crosses on to the anterior surface of the uterus at a point about the level of the os internum. From this it passes up over the anterior surface of the uterus. Thus there is formed a vesico-uterine pouch, containing no small intestine either when the bladder is in systole or in diastole (figs. 38 and 39). When the bladder has the Y-shape pathologically produced [*vide* postea], the peritoneum passes directly backwards across the fundus of the bladder and on to the anterior surface of the uterus at or below the level of the

os internum (fig. 40). There is thus produced a utero-abdominal pouch (fig. 40).

The peritoneum covers the whole of the anterior surface of the uterus above the os internum, passes over the fundus and down the posterior surface, which it covers almost completely. From this it descends still deeper, on to the posterior aspect of the posterior vaginal wall for about one inch (fig. 38). The amount of its dip varies, however. In one section by Pirogoff (fig. 41) the peritoneum runs down on the posterior vaginal wall till within about an inch from the vaginal orifice. This extent of posterior peritoneal duplicature is, of course, abnormal. The depth of the peritoneal pouch behind the uterus is greater on the left side than on the right. That its depth varies is quite evident on section, as in some sections it ends at the level of the posterior fornix (fig. 39), while in others it is seen passing as deeply as has been already described (figs. 38, 41). This descent of the peritoneum behind the uterus is of the highest importance practically, and forms the well-known pouch of Douglas. This pouch is best defined as follows :—Its upper lateral boundaries are the utero-sacral ligaments ; its anterior boundary is the uppermost inch of the posterior vaginal wall and posterior aspect of the supra-vaginal portion of cervix ; its posterior boundary is the sacrum and rectum, covered by peritoneum. It is the lowest part of the peritoneal cavity, and from its relation to the posterior vaginal wall can be explored through the posterior vaginal fornix. It is partially filled by intestine when the uterus lies to the front, which becomes displaced when the uterus is retroverted or retroflected.

2. *The Disposition of the Pelvic Peritoneum at the sides of the Uterus. The Broad Ligaments.*—At the sides of the uterus, the peritoneum clothing its anterior and posterior surfaces, passes outwards and somewhat backwards to the sides of the pelvis in front of the sacro-iliac synchondrosis. In this way we get two laminæ of peritoneum nearly in apposition, which become more separated at their junction with the pelvic floor and sides of the pelvis. These are the broad ligaments of the uterus.

Just within their upper free margin the Fallopian tubes are placed. That part of the free margin not occupied by the Fallopian tube forms the infundibulo-pelvic ligament of the ovary (figs. 22 and 53). Projecting through the posterior lamina of the broad ligament is the ovary, covered by its germ-epithelium. The ovarian ligament and parovarium have already been described under the ovary and Fallopian tube.

Between the layers of the broad ligament lie connective tissue, unstriped muscle, bloodvessels, and lymphatics. According to M. Guerin, the broad ligaments enclose a small space shut off from the rest of the cellular tissue of the pelvis, and he denies that as yet there is proof of any special diagnosable inflammatory affection of the broad ligaments. Guerin alleges that, by inflation, it can be demonstrated that the broad ligaments are thus shut off—a fact denied by other observers.

The position of the broad ligaments varies according to that of the uterus. When the uterus is normal in position, *i.e.*, lying to the front, their posterior surfaces look upwards and somewhat backwards, and they run outwards and backwards as already described. Displacement of the uterus backwards causes their coincident displacement, and in pregnancy they are drawn up and lie almost vertically. Pathologically, they cicatrize after inflammatory attacks causing unilateral deviations of the uterus.

3. *The Pelvic Peritoneum on the side walls of the Pelvis.*—The Pelvic peritoneum clothes the side walls of the pelvis. It dips down least at the side of the bladder and most at the utero-sacral ligaments.

Although the Pelvic Peritoneum has been described in three sections, it must of course be kept in mind that it is a continuous membrane, with no breaks in its continuity.

Some special facts about the peritoneum should now be noted.

1. *As to the Bladder.*—When the bladder is distended, the peritoneum is stripped off the lower part of the anterior abdominal wall to an extent varying with the distention (Fig. 44). During parturition, the Peritoneum is drawn off the bladder (Fig. 43) (Hart).

2. *As to the Rectum.*—Its upper part is completely invested by peritoneum; the second part is only partially covered, *i.e.*, the peritoneum gradually leaves the rectum, quitting first the posterior surface, then the sides, and finally passing from the anterior surface on to the posterior vaginal wall as already described.

Over the bladder and anterior abdominal wall the peritoneum is easily separable. According to Spiegelberg, above the os internum uteri posteriorly it is closely blended with the uterus, below this quite loosely.

Practical Points.—In no operative procedure involving the anterior vaginal wall can the peritoneal cavity be opened into. In the upper third or so of the posterior vaginal wall the peritoneum may be opened into. This has indeed been done by the most skilful operators, but the risks attending it are not so considerable as usually alleged, especially when drainage tubes are employed. When the fingers are passed into the posterior fornix vaginae, only about $\frac{1}{3}$ inch of tissue intervenes between them and the peritoneum. The possibility of there being a deep dip of the peritoneum, as shewn at fig. 41, should not be forgotten.

CONNECTIVE TISSUE OF PELVIS.

By this we understand (I.) the Fascia described so elaborately by the human anatomist as the Pelvic Fascia; and (II.) the loose Connective Tissue padding the interstices between the muscles, lying round the cervix uteri and spreading out beneath the Pelvic Peritoneum.

I. The *Pelvic Fascia* of the anatomist is carefully described in the ordinary systematic and dissecting-room manuals, to which the student is therefore referred.

II. The loose connective tissue found lying subperitoneally, surrounding the cervix uteri and spreading out between the layers of the broad ligament, is of the highest importance pathologically, as in it and in the pelvic peritoneum occur those inflammatory exudations so common in women. Of late years our knowledge of the disposition of this tissue has been rendered much more accurate, and accordingly our discrimination of pelvic inflammatory attacks made much more precise.

The distribution and relations of the pelvic connective tissue may be studied in various ways. The most valuable information is obtained by considering sections of frozen or spirit-hardened pelves. This gives the precise position of the tissue, its amount, and distribution. The sections are made in various directions: antero-posteriorly, in the middle line (sagittal mesial); antero-posteriorly, at the junction of the broad ligaments and uterus (lateral sagittal); horizontally, at various levels; and finally, coronally, *i.e.*, parallel to the coronal suture and dividing the pelvis into anterior and posterior portions. Another valuable method of investigation is to inject air beneath the peritoneum, between the layers of the broad ligament and at other points. By this we learn the varying attachments of the pelvic peritoneum to the subjacent tissue, and the lines of cleavage, as it were, of the pelvic connective tissue along which pus will burrow.

Instead of air we may inject plaster of Paris or water; plaster of Paris will be found the most useful. We therefore consider—

a. Results obtained by section.

b. Results obtained by the injection of water, air, plaster of Paris.

a. Results obtained by Section.

1. *Vertical Mesial Section.*—This shows a large amount of loose tissue lying between the posterior aspect of the symphysis pubis and the angle formed by the urethra and anterior wall of bladder—the retro-pubic fat deposit (Hart). It is a matter of some importance to note its shape when the bladder is empty and the female in the dorsal

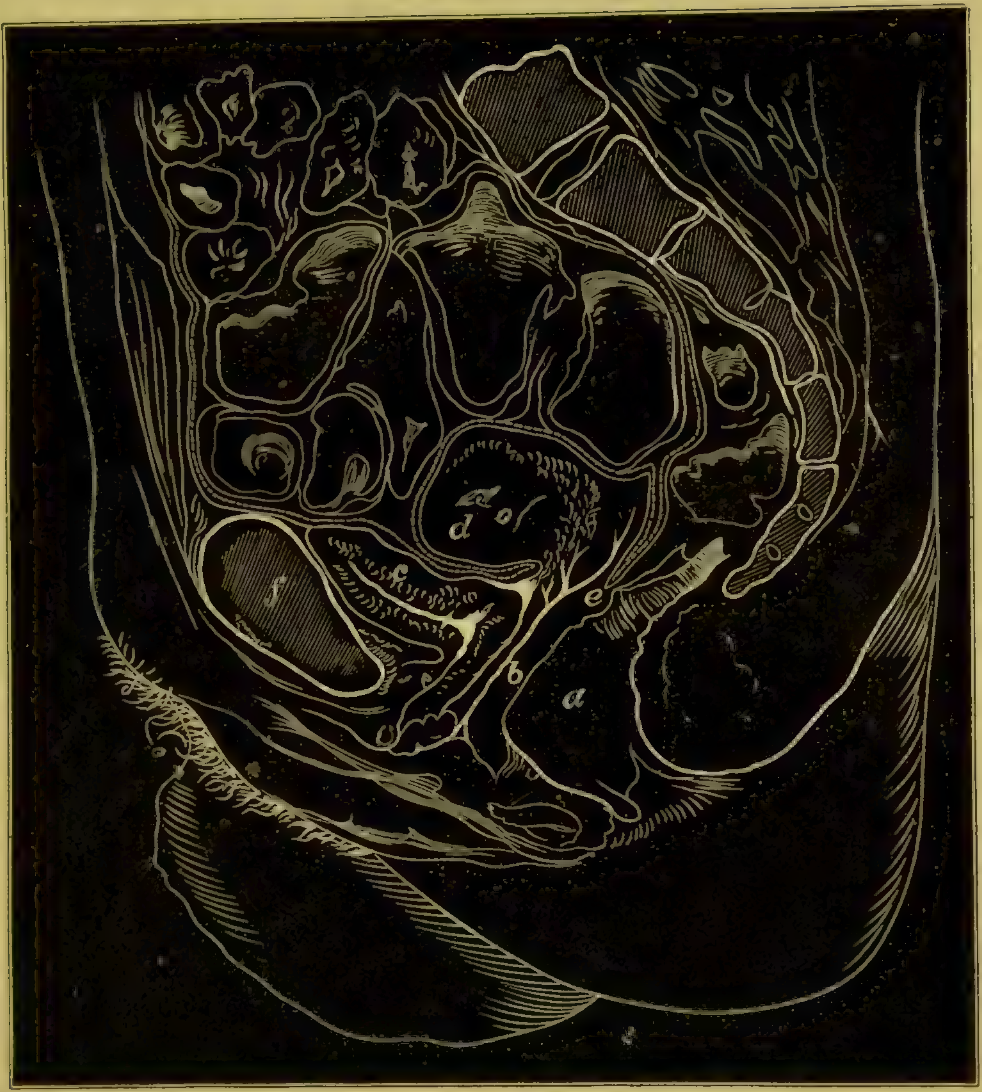


Fig. 38.

Frozen section showing peritoneum (Fürst). The dotted line indicates peritoneum in this and figs. 36-44. *a* Anus; *b* Vagina; *c* Bladder; *d* Uterus; *e* below pouch of Douglas; Symphysis pubis (½).

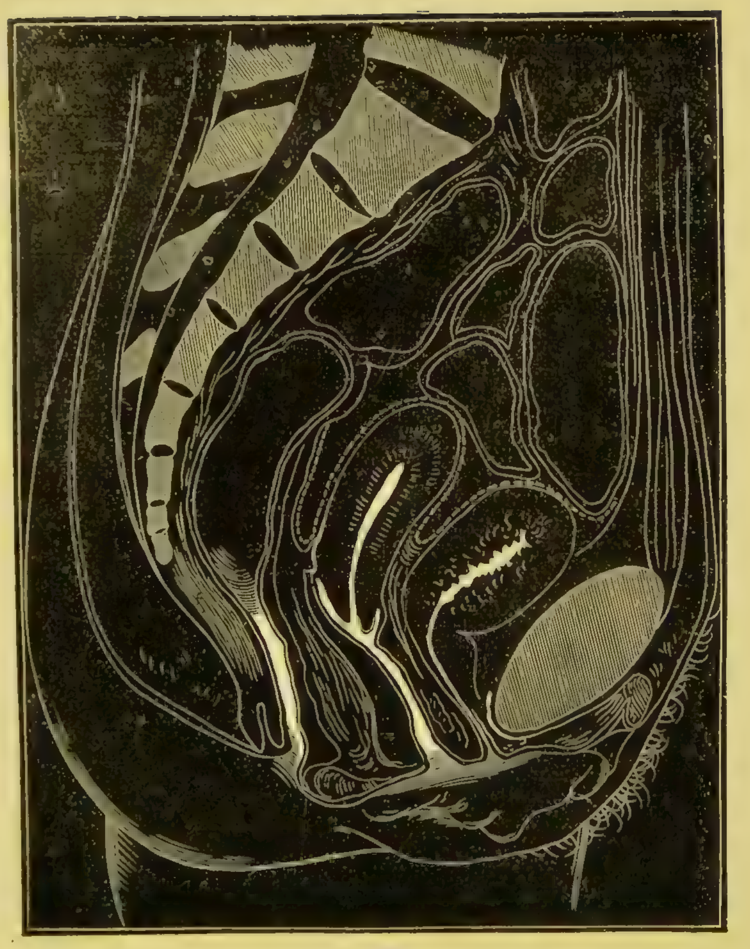


Fig. 39.

Frozen section showing peritoneum in contracted bladder (Heitzmann).

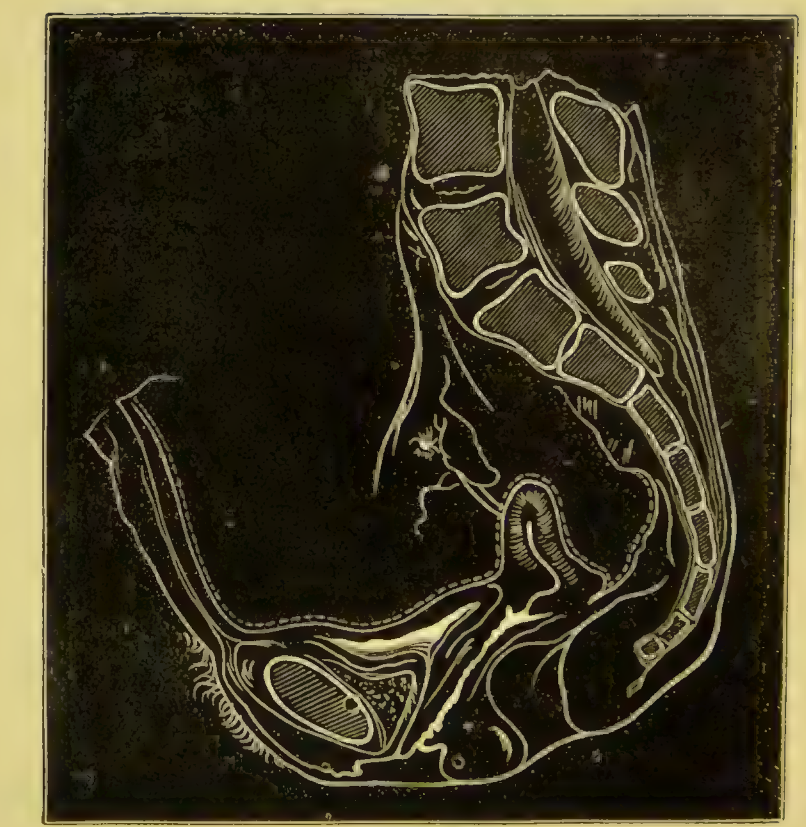


Fig. 40.

Section (Spirit-hardened), shewing peritoneum when uterus is drawn back by posterior pelvic cellulitis (Hart).

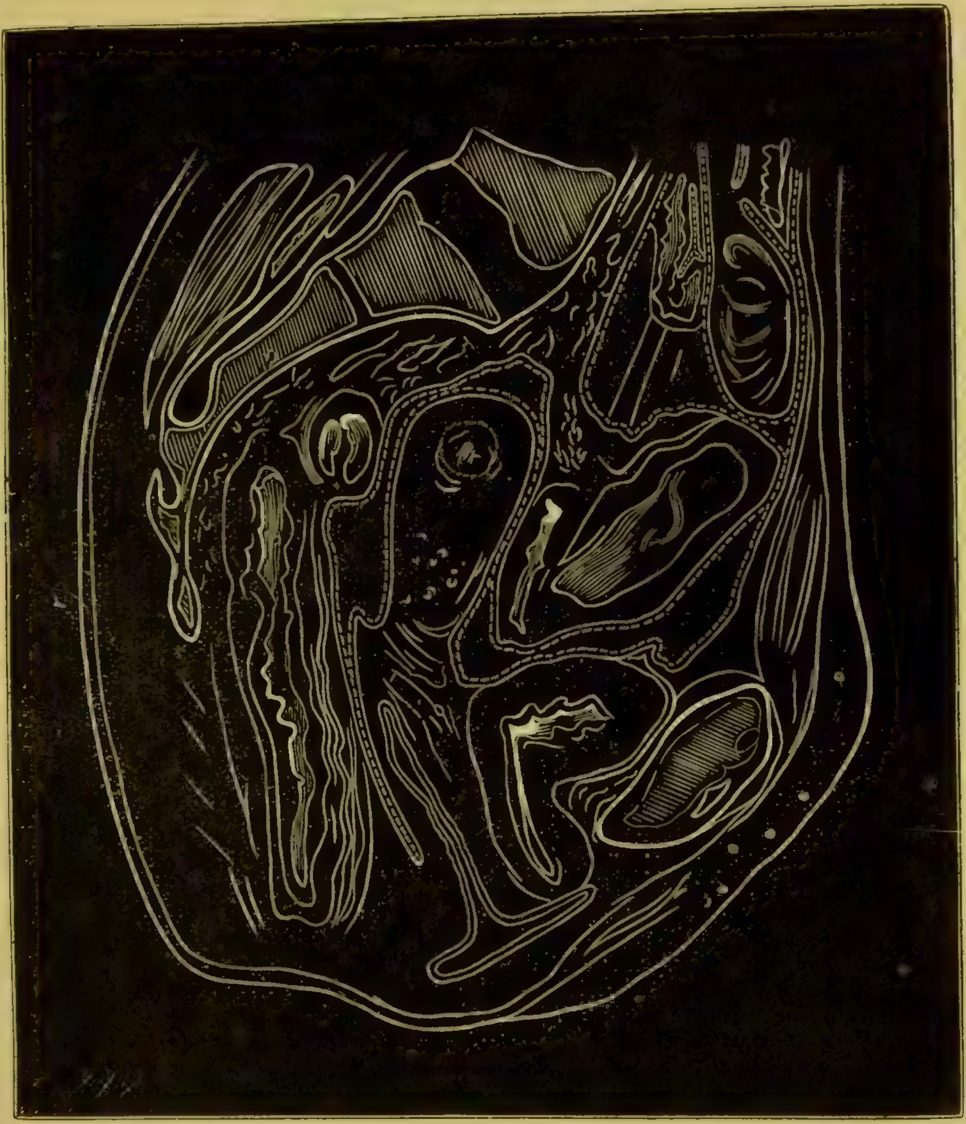


Fig. 41.
Peritoneum dipping abnormally deep between rectum and vagina (Pirogoff).

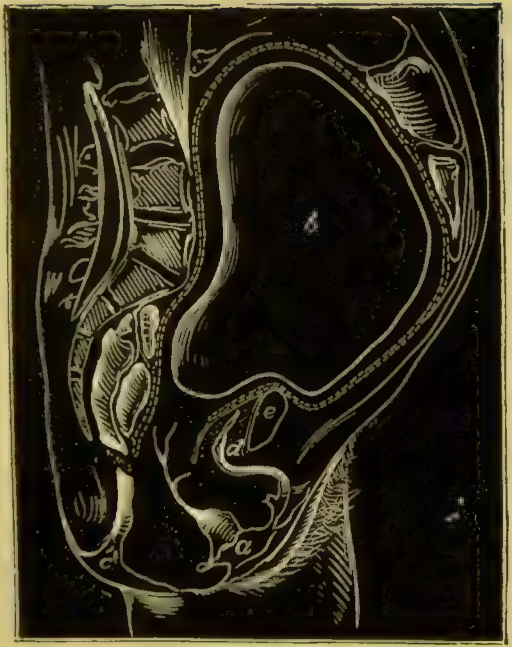


Fig. 42.
Relation of Peritoneum to Bladder at end of Pregnancy (Braune). (Frozen.)
a Vaginal entrance; *b* Uterus; *c* Anus; *d* Bladder
e Symphysis.

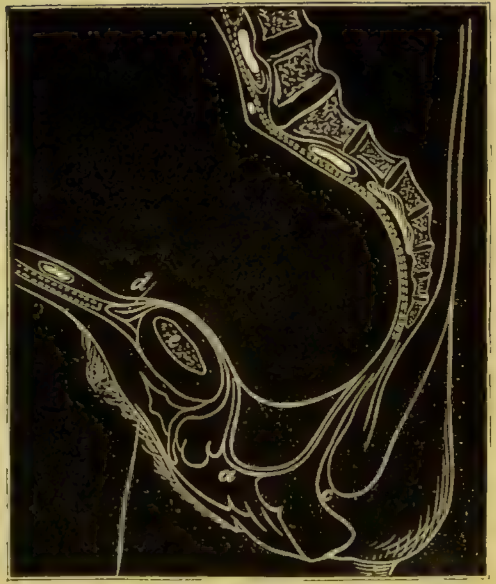


Fig. 43.
Relation of Peritoneum to Bladder during Parturition (Braune). *a* Vagina; *d* Bladder; *c* Anus.

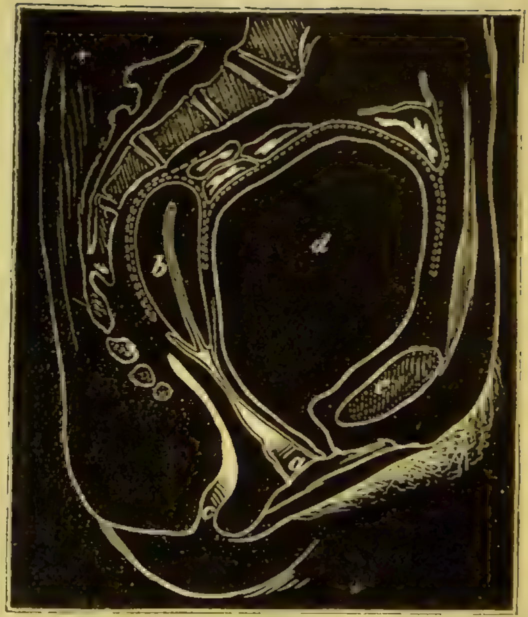


Fig. 44.
Relation of Bladder and Peritoneum when Bladder distended (Pirogoff).
a Vagina; *b* Uterus; *c* Anus; *d* Bladder *e* Symphysis.

posture. It is then distinctly triangular. Between the sacrum and rectum, between the posterior wall of the bladder and the uterus, and between the supra-vaginal portion of the cervix and posterior vaginal wall, connective tissue in comparatively small amount is distributed (figs. 34, 39). Note specially that loose tissue separates the posterior vaginal wall from the anterior rectal wall as far as the apex of the perineal body where they are closely blended (fig. 35); that the urethra and anterior vaginal wall have no such loose tissue intervening, *i.e.*, are closely united ; while, as already stated, the anterior vaginal wall and posterior aspect of bladder are separated by tissue.

2. *Lateral Sagittal Section.*—By this section a specially valuable view is obtained. Fig. 45 shows an accurate drawing of such a section, just at the junction of the uterus and broad ligaments. It

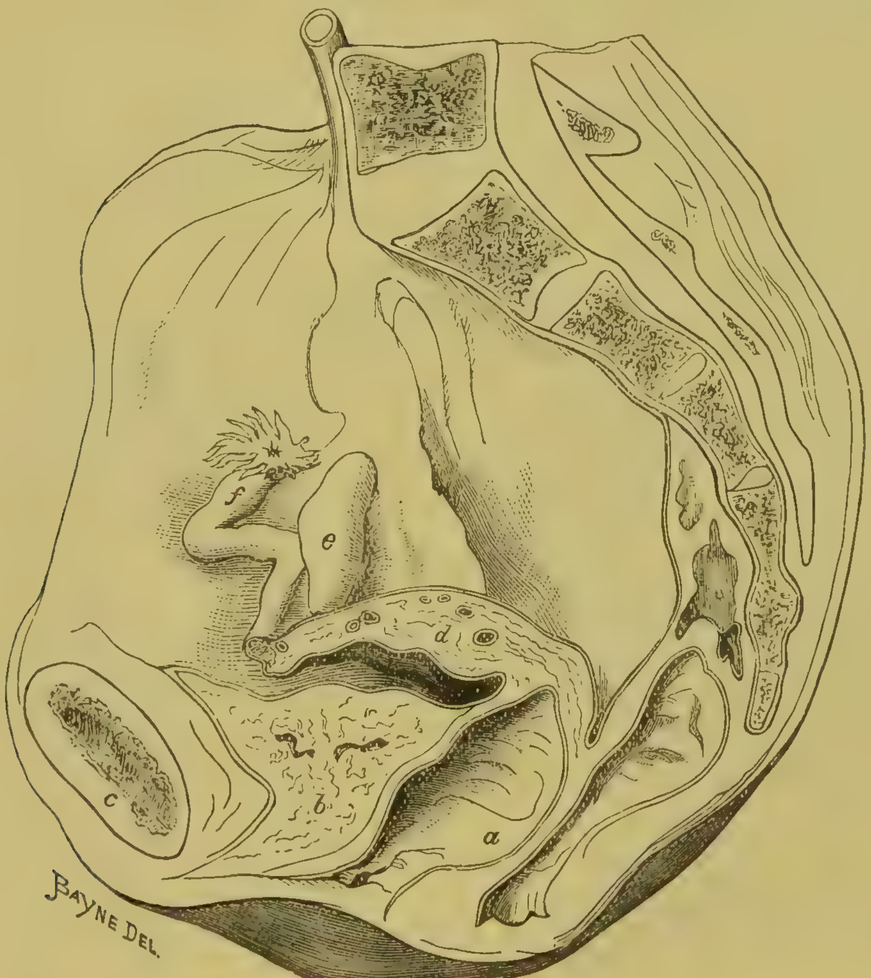


Fig. 45.

Lateral Sagittal section of pelvis at junction of broad ligament and uterus. *a* Vagina with its walls separated; *b* Bladder; *c* Symphysis; *d* Broad ligament; *e* Ovary; *f* Fallopian Tube.

should be noted that the amount of retropubic tissue is less than in the sagittal mesial one; that at the junction of the broad ligaments with the uterus there is a large amount of tissue with large bloodvessels; and specially that the finger placed in the lateral fornix vaginæ touches the base of the broad ligament there. This fact is valuable as to diagnosis. On section, the boundaries of the space between the broad ligaments are seen; superiorly the cut section of the Fallopian tube, anteriorly and posteriorly the peritoneum, and inferiorly the vaginal fornix. The assertion by Guerin and Le Bec as to the insignificance of the tissue here is not borne out.

Sections made nearer the side pelvic wall display specially the lessening tissue between the layers of the broad ligaments and show sections of the ovary.

3. *Horizontal sections* give results confirming those above stated. It is unfortunate that no good sections are as yet published. Pirogoff gives several, but these are not clearly defined in their connective tissue relations. Freund has published an admirable description of his preparations, but it is to be regretted that he has not figured them. The most valuable sections are those at the level of the supravaginal

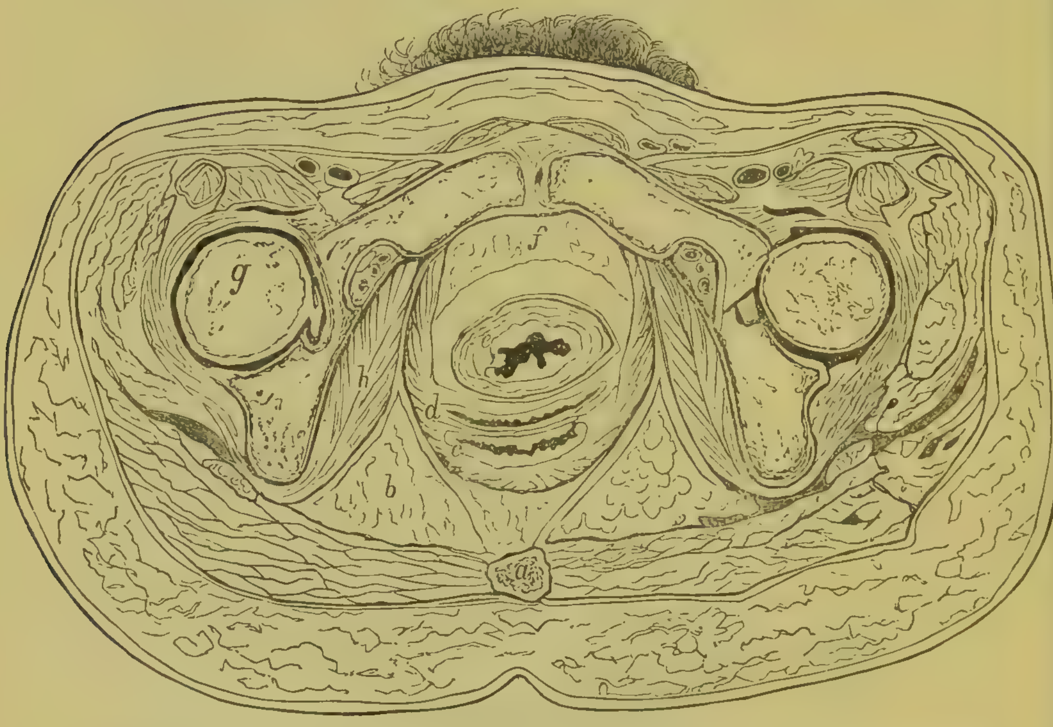


Fig. 46.

Transverse section of Female pelvis at plane of hip-joints (Ruedinger). *a* Coccyx; *b* Ischiorectal fossa *c* Rectum; *d* Vagina; *e* Bladder; *f* Retropubic fat; *g* Hip-joint.

portion of the cervix, which show the tissue lying here all round it. At fig. 46 we show a section from Ruedinger where the retropubic fat and ischiorectal cavities are well shown.

This is the best place to draw special attention to what Virchow first termed the parametric tissue. By this term he meant the loose fatless tissue (2 cm. thick), with abundant bloodvessels and lymphatics, surrounding "the lower portion of the uterus and the upper portion of the vagina" (Spiegelberg). This is the parametric tissue proper. Some extend the meaning of the term parametric tissue so as to include all the connective tissue in the pelvis.

4. *Coronal Section.*—There has been published no frozen coronal section of the pelvis alone. Fig. 47 and Plate II. show Ruedinger's coronal section of a female cadaver, but this displays little of the pelvic relations. This section will, however, be considered afterwards.

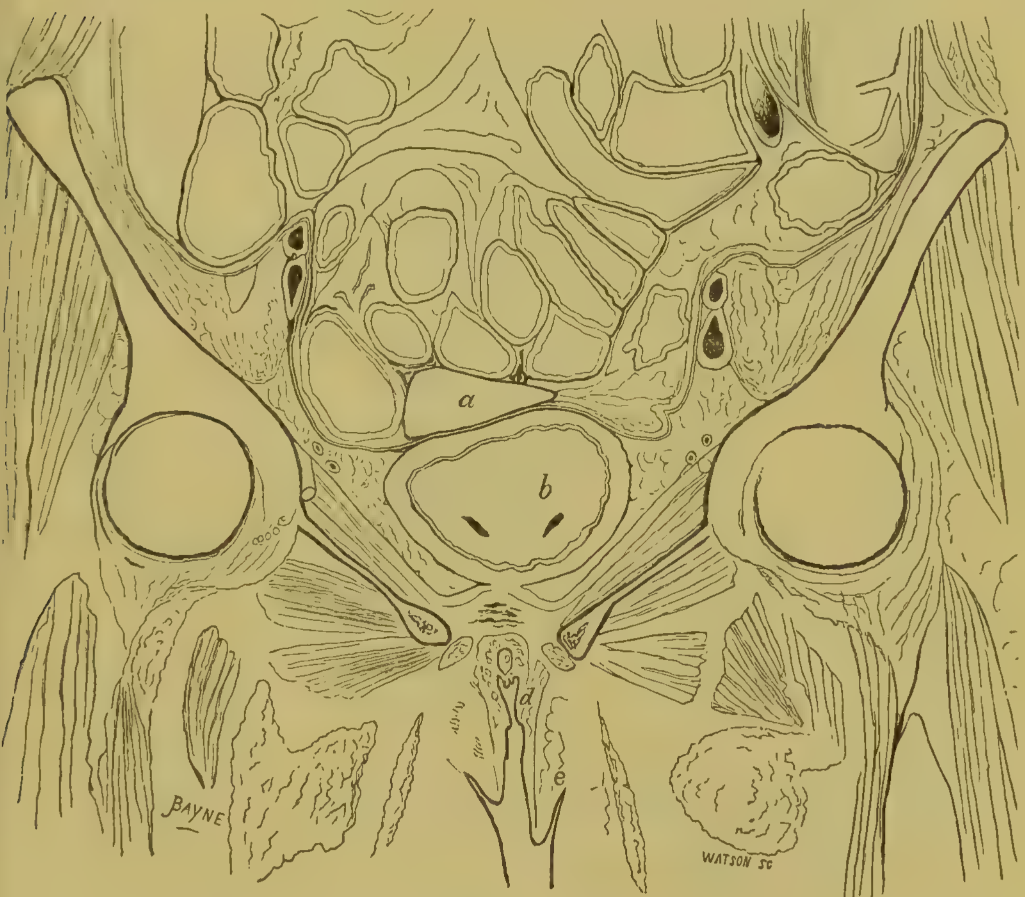


Fig. 47.

Coronal frozen section of pelvis (Ruedinger). *a* Fundus uteri; *b* Bladder; *d* Labium minus; *e* Labium majus.

A useful diagram of a coronal section of the pelvis is given by Luschka. It shows well the relations of the cavity of the pelvis to the subperitoneal connective tissue and the ischiorectal fossa (fig. 48). These Luschka terms—

(1.) Cavum pelvis peritoneale (Fig. 48, *a*),
(2.) „ „ subperitoneale (do., *b*),
(3.) „ „ subcutaneum (do., *c*),

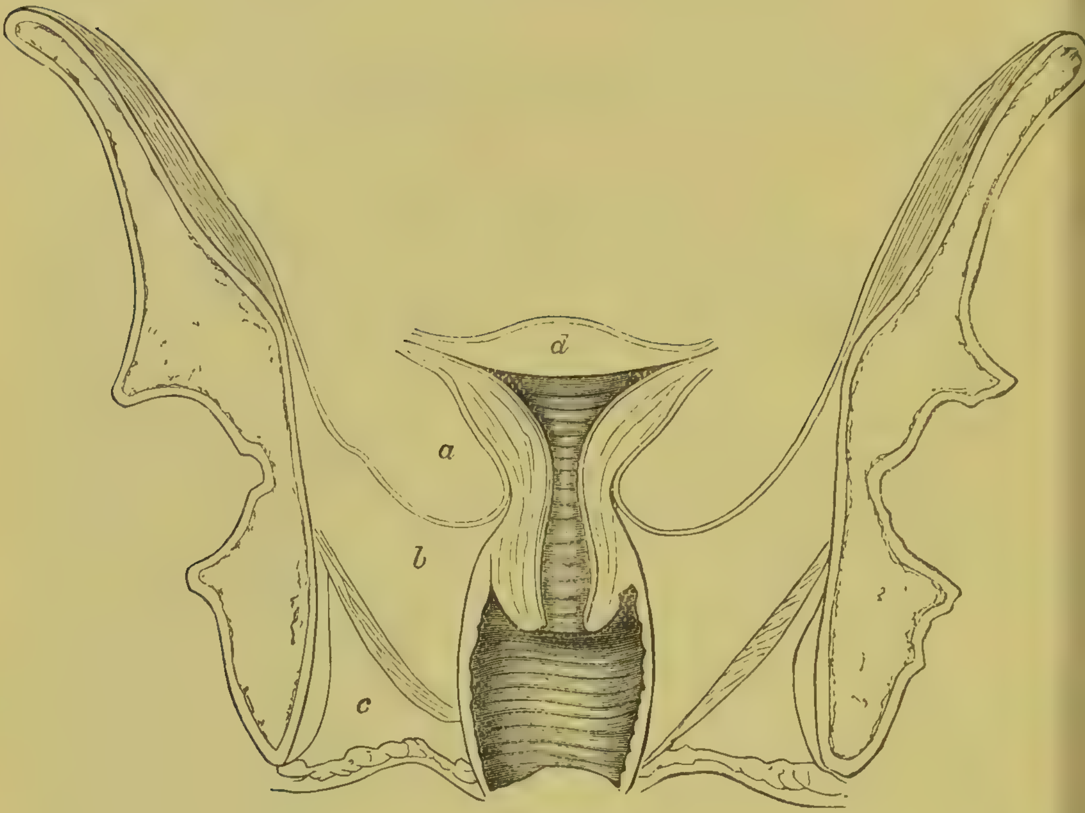


Fig. 48
Diagram of Coronal section of pelvis (Luschka). *a* Peritoneal cavity; *b* Subperitoneal cavity; *c* Ischiorectal fossa; *d* Uterus.

According to him the ischiorectal fossa communicates with the subperitoneal connective tissue by means of minute apertures.

b. Results obtained by injections of water, air, or plaster of Paris.

The best summary of these results is given by Bandl to whom on this point we are indebted for much valuable information.

König in his researches employed the bodies of women who had died a short time after labour from non-puerperal diseases, and injected air or water. The following briefly are his results :—(1.) Water injected between the layers of the broad ligament high up in front of the ovary passed first into the tissue lying at the highest part of the side wall of the true pelvis. It then passed into the tissue of the iliac fossa lifting up the peritoneum, and followed the course of the psoas, passing only slightly into the hollow of the iliac bone. Lastly, it separated the peritoneum from the anterior abdominal wall for some little distance above Poupart's ligament, and from the true pelvis below it.

(2.) On injection beneath the base of the broad ligament to the side and in front of the isthmus, the deep lateral tissue became filled first ; then the peritoneum became lifted up from the anterior part of the cervix uteri. The separation passed thence first to the tissue near the bladder, and ultimately the fluid passed along the round ligament to the inguinal ring. There it separated the peritoneum along the line cf Poupart's ligament and passed into the iliac fossa.

(3.) An injection at the posterior part of the base of the broad ligament filled the corresponding tissue round Douglas' space, and then passed on as described at (1).

Schlesinger has followed out these results in more elaborate researches, which, we regret, space prevents us quoting.

The significance of these investigations will be referred to under Pelvic Peritonitis and Pelvic Cellulitis.

CHAPTER II.

THE POSITION OF THE UTERUS AND ITS ANNEXA, AND THE RELATION OF THE SUPERJACENT VISCERA.

LITERATURE.

Braune—Op. cit. *Claudius*—On the Position of the Uterus: Med. Times and Gazette, 1865, p. 5. *Credé*—Beiträge zur Bestimmung der normalen Lage der gesunden Gebärmutter: Archiv. f. Gynäkologie, Bd. I., S. 84. *Foster*—A contribution to the Topographical Anatomy of the Uterus and its surroundings: Am. J. of Obst. XIII. p. 30. *Hasse*—Beobachtungen über die Lage der Eingeweide im weiblichen Beckeneingange: Archiv. f. Gynäk. Band, viij., S. 402. *Pirogoff*—Op. cit. *Sappey*—Op. cit. *Schroeder*—Op. cit. *Schultze*—Zur Kenntniss von der Lage der Eingeweide im weiblichen Becken: Archiv. für Gynäk., Bd. IX., S. 262. An admirable account of the subject will be found in Dr Van de Warker's articles on a study of the Normal Movements of the Unimpregnated Uterus: N. Y. Medical Journal, XXI., p. 337; and on the Normal Position and Movements of the Unimpregnated Uterus: Am. J. of Obst., Vol. XI., p. 314. The literature is also well given there and in Foster's paper.

The amount of literature, chiefly French and German, on this subject is much too extensive even to be mentioned here. This is partly due to the inherent difficulty of accurate clinical observations, to the erroneous opinions advanced by many eminent anatomists, and to arbitrary demands as to the normal uterine position made by gynecologists with strong opinions on anteversion.

Thus, in the well-known works of Braune, Luschka, Cruveilhier, and Henle, the uterus is figured from actual sections as normal with the fundus in the hollow of the sacrum, *i.e.*, retroposed. Claudius of Marburg, also an anatomist, is uncompromising on this point. He states, indeed, that the uterus is normal only when, with its broad ligaments, its posterior surface touches the sacrum as closely as the lungs do the ribs (Fig. 49). Now, all gynecologists agree, from clinical observation, that the body of the uterus lies over on the bladder, with the os uteri looking more or less back. This divergence of opinion is extraordinary; and it leads to this interesting practical observation, that what the anatomist considers a uterus normal in position, the gynecologist believes to be abnormal. That is, the retroverted uterus—

considered normal in cadavera by the anatomist—is, when found in the living woman, replaced by the gynecologist so that it lies with its body over the bladder.

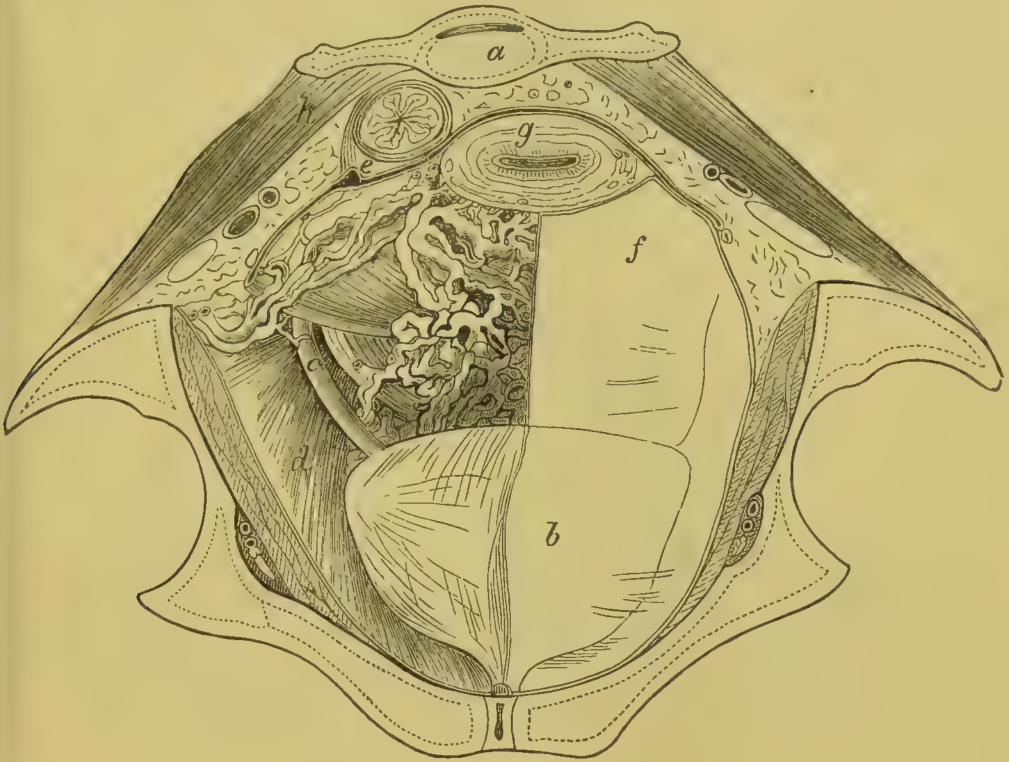


Fig. 49.

Transverse section of pelvis in line of pyriform muscles (Luschka). The peritoneum has been removed on the right side *a* 3d sacral vertebra; *b* bladder; *c* ureter; *d* levator ani; *e* rectum; *f* anterior layer of broad ligament; *g* uterus: *h* pyriform muscle. Note that here the uterus is retroverted, and the pouch of Douglas without intestine.

There can be no doubt that the uterus lies normally to the front, with its anterior surface resting on the bladder. Great refinement is exercised, quite unnecessarily, by many gynecologists in settling what they believe to be the exact angle which the long axis of the uterus should make with the horizon, when a woman is in the erect posture; and this refinement has been greatly stimulated by the mechanical treatment of what is known by many as anteversion of the uterus.

In treating of this vexed question we shall consider—

1. The normal form and position of the uterus.

2. The local divisions of the pelvic floor peritoneum as viewed through the pelvic brim, and the position of the uterus and its annexa.

3. The physiological changes in the position of the uterus.

4. The relation of the small intestine to the pelvic floor and to the uterus and its annexa.

THE NORMAL FORM AND POSITION OF THE UTERUS.

The question of form of the uterus we consider only in the limited aspect of the angular relation of the long axis of the uterus to the long axis of the cervix. These are not in the same straight line but, when the bladder and rectum are empty, lie at an obtuse angle of varying value. This angle is much less in multiparous women (fig. 27), and more marked in nulliparae (fig. 50). The position of the uterus, with empty bladder and rectum, is such that it lies with its anterior surface touching the posterior aspect of the bladder, no intestine intervening: the os externum uteri looks downwards and backwards; and the uterus is slightly twisted as a whole on its long axis, so that the uterine end of the right Fallopian tube is nearer the symphysis than that of the left. We have expressly said with bladder and rectum empty. According to Schultze, the long axis of the uterus is nearly parallel to the horizon. This is probably exaggerated as Schultze's researches were conducted in a way that certainly anteverted the uterus unduly (figs. 27 and 50). Many authors figure the uterus nearly vertical to the horizon, for this purpose distending the bladder until the uterus is

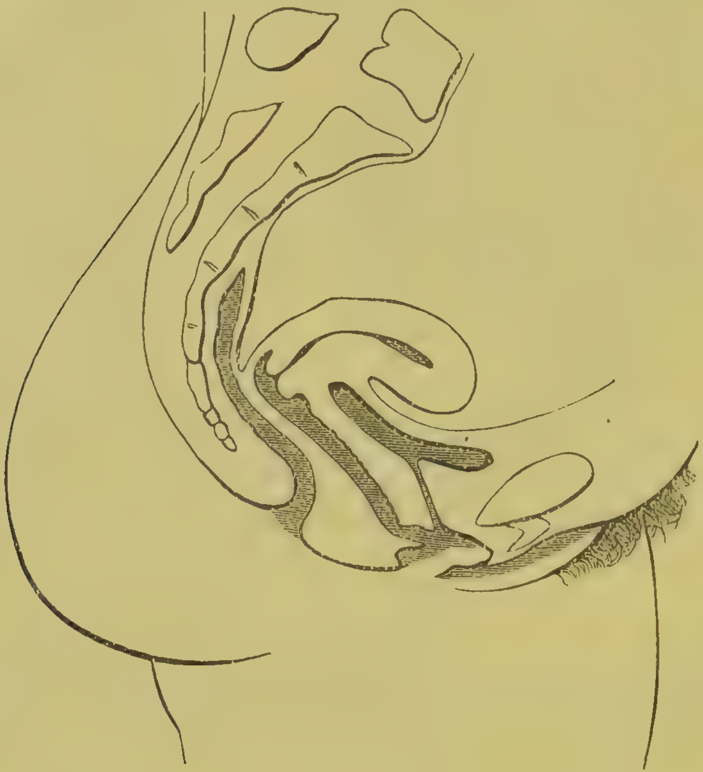


Fig. 50.

Diagram to show normal form and position of Virgin Uterus (Schultze).

elevated to what they consider the proper angle (fig. 51). It is needless to say how absurd this is. Kohlrausch's diagram so often quoted in

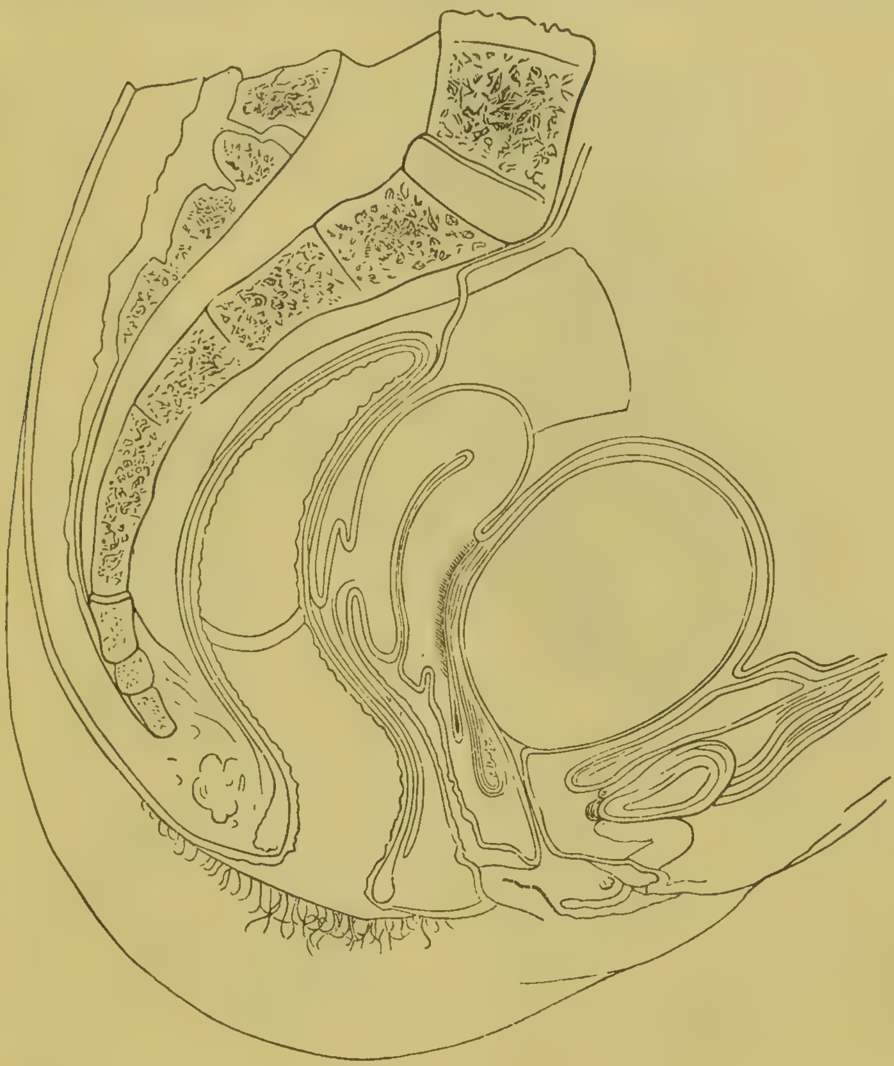


Fig. 51.

Section of Pelvis, shewing Uterus driven back by distended Bladder and Peritoneum disturbed (Kohlrausch). *This is not a normal condition of parts by any means.*

support of this allegation really shows, if it show anything, the position of the uterus when the bladder is well distended. The student should note this point, as Kohlrausch's section is the favourite diagram of those who treat as pathological what is really a normal uterus. Fig. 52, from Pirogoff, shows a frozen section supporting Schultze's contention.

It is important to know how results as to the uterine position have been obtained. The chief methods are as follows :—

(1.) *By frozen, spirit-hardened, or chromic acid sections.*—Results obtained in this way are not specially valuable, as there is some *post mortem* change in the uterine position not yet thoroughly understood.

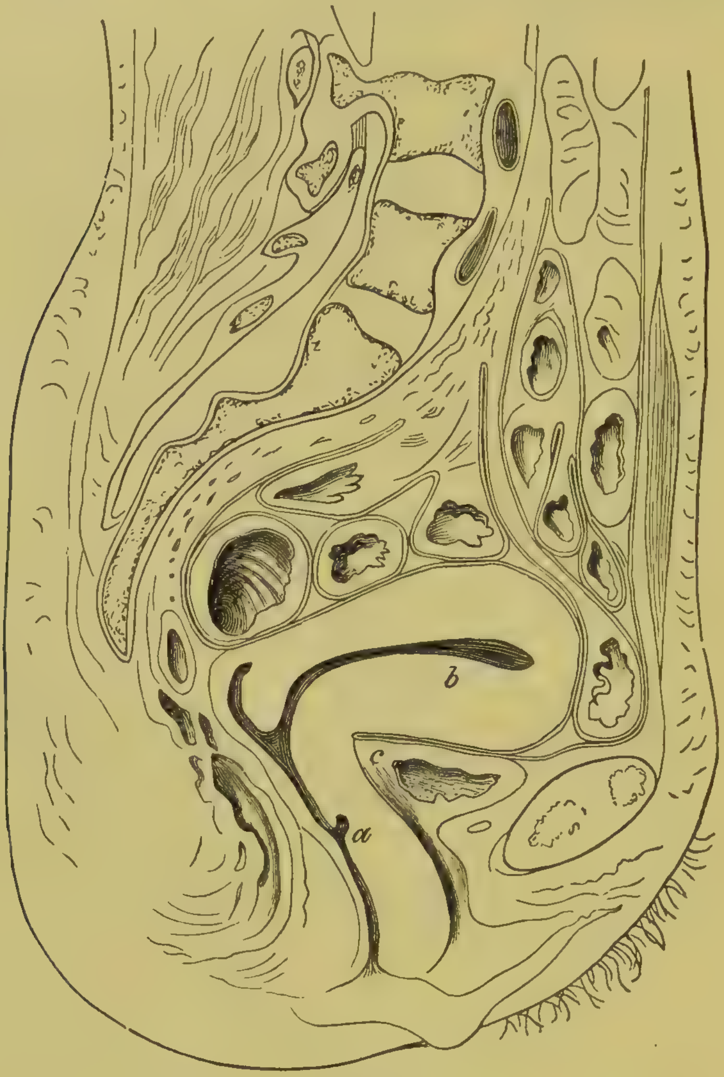


Fig. 52.

Section of Female Cadaver (Pirogoff).
a Vagina; *b* Uterus; *c* Bladder.
Note Bladder in diastole, Uterus parallel to horizon, and shallow dip of Douglas' Pouch.

(2.) *By the bi-manual examination of the Pelvic Contents.*—This is probably the best method, although it exaggerates the normal anteversion of the uterus in a way that will be readily understood when the chapter on the bi-manual has been studied.

(3.) *By the use of the sound*, or by a more elaborate means described by Schultze. Space does not permit of a full description of the latter, but a good account of it is given in Foster's paper.

THE LOCAL DIVISIONS OF THE PELVIC FLOOR PERITONEUM AS VIEWED THROUGH THE PELVIC BRIM, AND THE POSITION OF THE UTERINE ANNEXA.

For valuable papers and sections on this subject, we are indebted to Hasse of Breslau and Ruedinger of Munich (fig. 53 and plate II.). Hasse froze not quite thoroughly a female cadaver in the upright posture, cut through the abdomen transversely, and then lifted out the softened viscera until the pelvic contents were exposed undisturbed. The bladder was moderately distended.

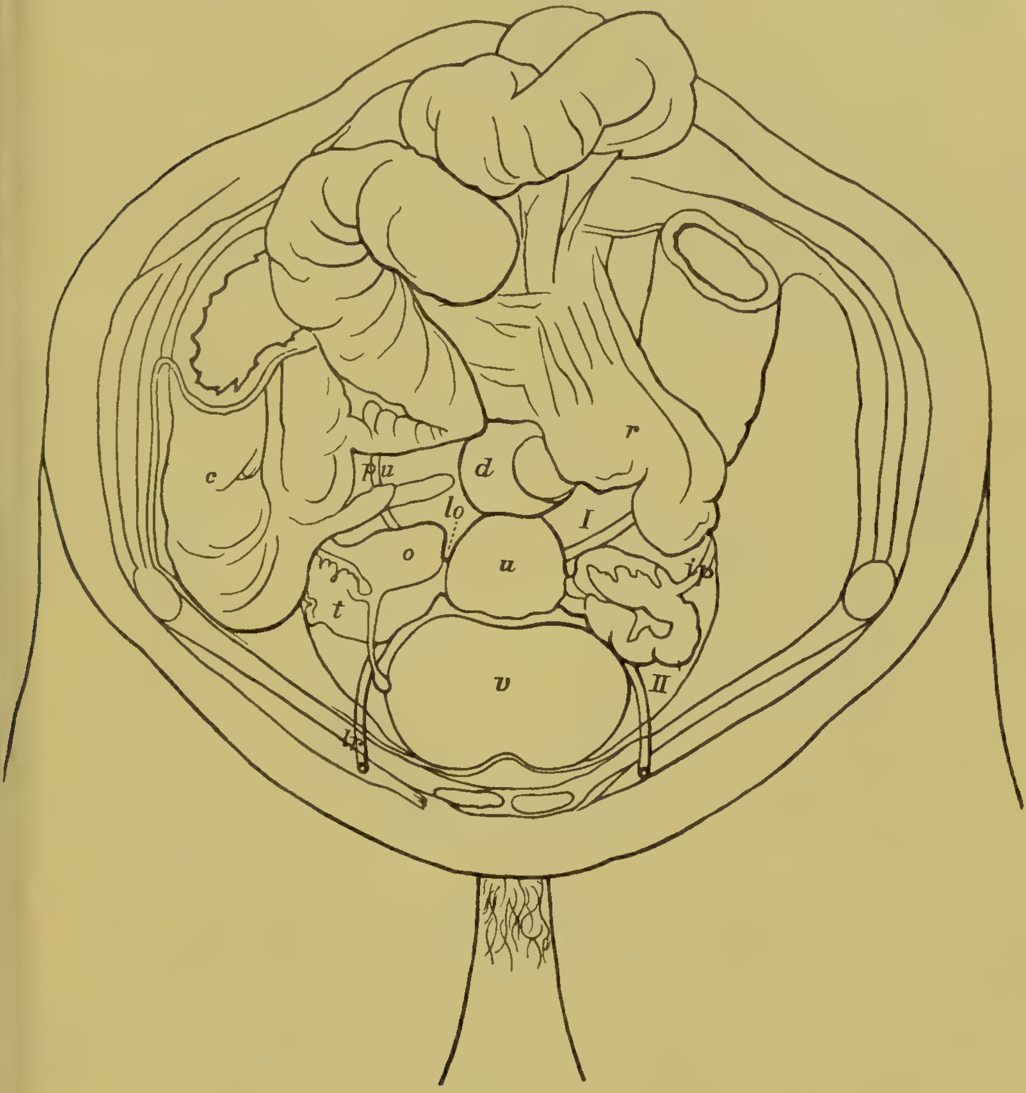


Fig. 53.

Female Pelvis and contents viewed through the Pelvic Brim (Hasse).
v Bladder; *II.* Paravesical Pouch; *u* Uterus; *o* Ovary; *t* Fallopian Tube; *d* Pouch of Douglas; *l* Lateral Pouch of Douglas; *i p* Infundibulo Pelvic Ligament; *l r* Round Ligament; *p u* Position of Ureter; *l o* Ovarian Ligament; *r* Rectum; *c* Colon.

Fig. 53 shows Hasse's drawing. The fundus of the uterus lying on the bladder is well seen. In front of the broad ligament—of which the infundibulo pelvic ligament is the only portion visible in fig. 53—we have, on each side, the paravesical pouch of the peritoneum. Behind it lies the lateral pouch of Douglas; while just behind the uterus and bounded on each side by the utero-sacral ligament is the pouch of Douglas proper. The Fallopian tubes lie in the true pelvis, in the paravesical pouch. Each broad ligament sweeps outwards and backwards to near the sacro-iliac synchondrosis of its own side. The position of the ureter is well indicated.

According to Hasse the long axis of both ovaries runs outwards and forwards, forming with the transverse axis of the uterus an angle open to the front. Part of each ovary (the half) projects above the plane of the pelvic brim. Schultze, on the other hand, figures the ovaries as having their long axes almost antero-posterior (fig. 54).

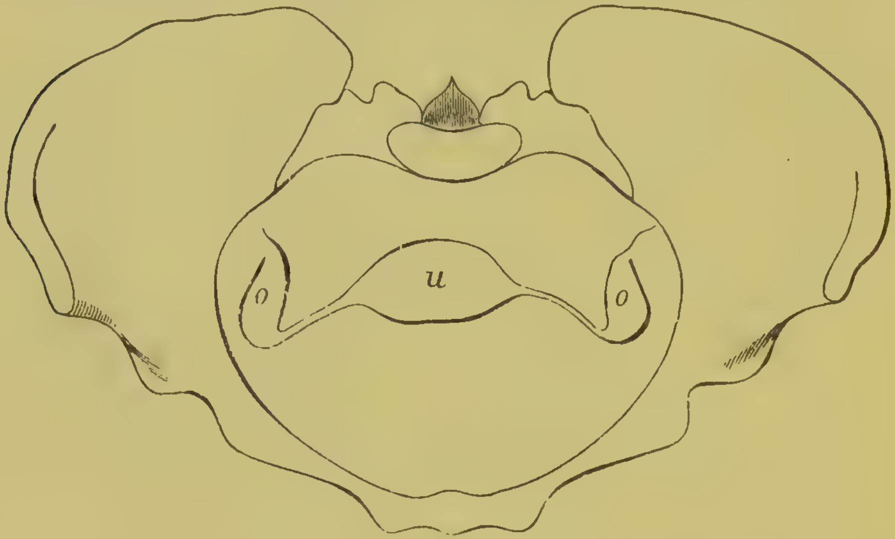


Fig. 54.

Position of Fundus Uteri and lie of Ovaries. Bladder distended (Schultze).

THE PHYSIOLOGICAL CHANGES IN THE POSITION OF THE UTERUS.

The mobility of the uterus is one of its most characteristic features. With every movement of respiration, in singing, walking, and in all violent movements, the uterine position is changed. Dr Van de Warker has studied, in a valuable paper, the influences bringing about these changes in position; this may be consulted for details of his method of investigation and results obtained.

Of the greatest importance is the effect of the distended bladder on the uterine position. As the bladder fills, the uterus becomes retroposed to an extent shown at figs. 51 and 54. The intestines are forced out of the upper part of Douglas' pouch, and the height of the peritoneal reflection from the anterior abdominal wall is considerably increased. All these points are well illustrated by fig. 44 from Pirogoff. As the urine is evacuated, the uterus passes forward to its normal anteverted condition and the intestines pass back into Douglas' pouch. Probably, undue distention of the bladder leads to permanent retroversion in some cases, especially if the uterus be gravid. Rectal distention displaces the uterus forwards and to the right side.

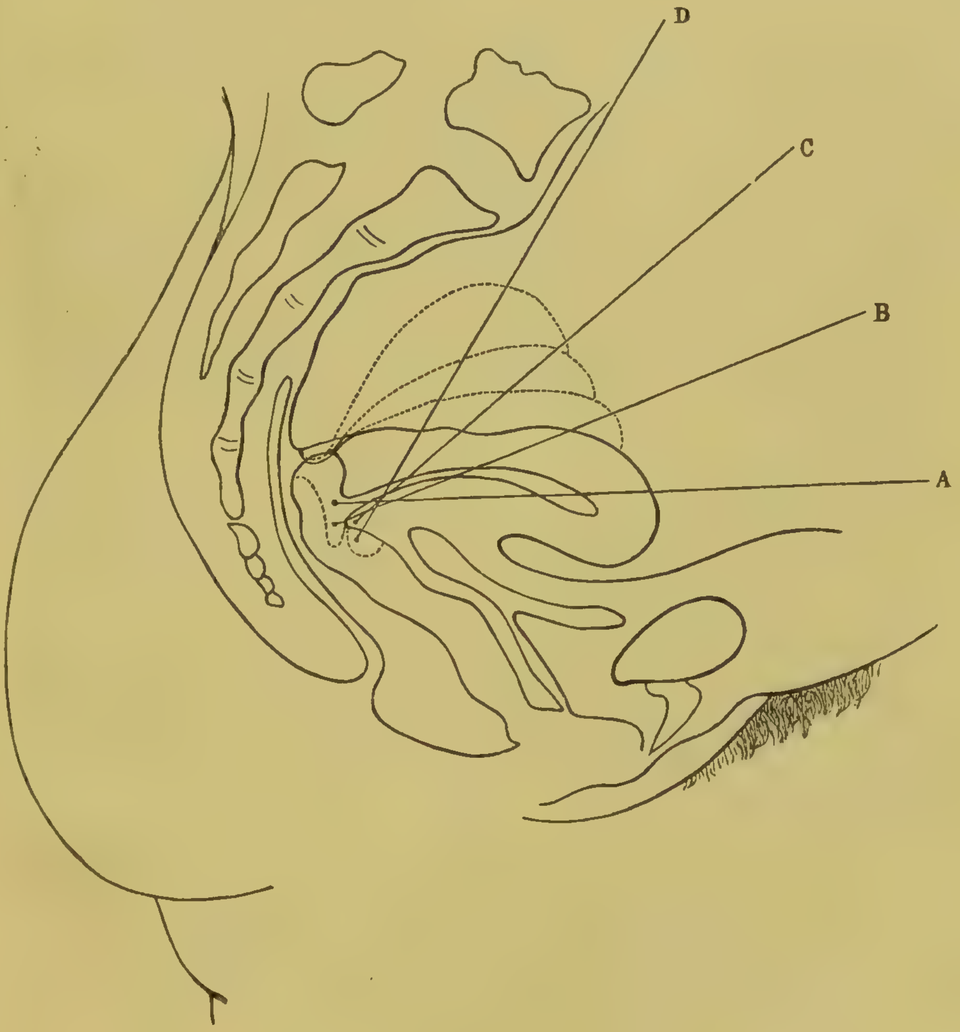


Fig. 55.

Position of uterus. *A* when bladder and rectum empty; *B*, *C*, *D* according to distention of bladder (Van de Warker).

THE RELATION OF THE SMALL INTESTINE TO THE PELVIC FLOOR AND TO THE UTERUS WITH ITS ANNEXA.

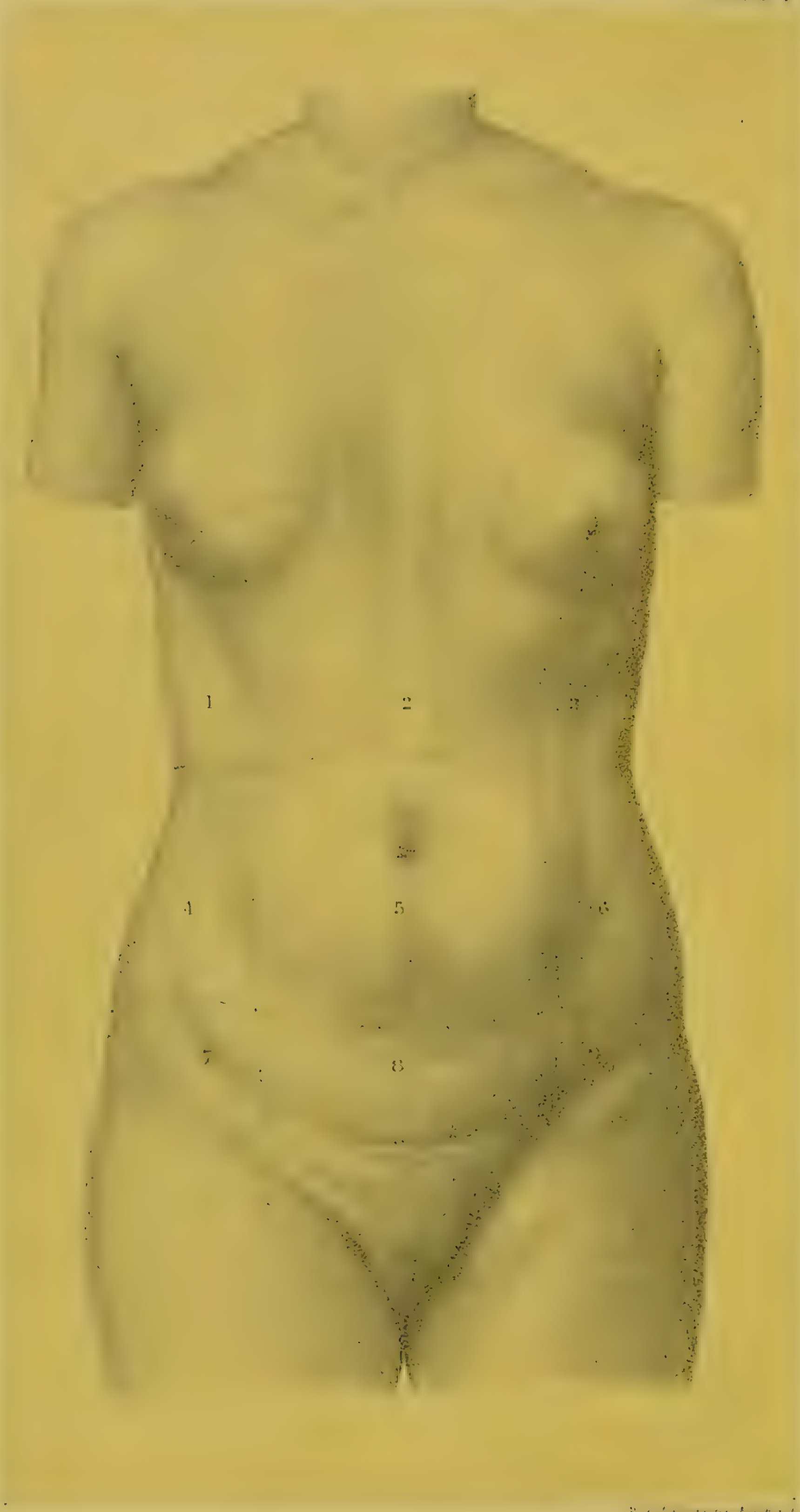
The small intestine lies resting on the uterus, ovaries, Fallopian tubes, and broad ligaments. There is no small intestine in the vesico-uterine pouch. *When the bladder is empty and the unimpregnated uterus to the front, there is small intestine in Douglas' pouch except at its very lowest part.* The pouch of Douglas becomes emptied of intestine as the bladder distends, and has no intestine in it when the uterus is retroverted. Many authors assert that there is never small intestine in Douglas' pouch. This opinion is undoubtedly wrong, as any one can satisfy himself by studying sections. Often Douglas' pouch contains serum, and this displaces the intestine. Figures 35, 39, 44 bear out these opinions; fig. 47 and plate II. should be carefully studied as illustrating the position of the superjacent intestines. The paravesical pouch probably contains intestine when the uterus lies to the front, and certainly contains it when the uterus is retroposed. Occasionally the omentum may interpose between the small intestine and the pelvic viscera.

To sum up briefly :—

a. The uterus and bladder behave practically as one organ *qua* position (*i.e.*, they move together), when the uterus is to the front.

b. The exact angle which the uterus makes with the horizon cannot be fixed, and knowledge on this point is not necessary.

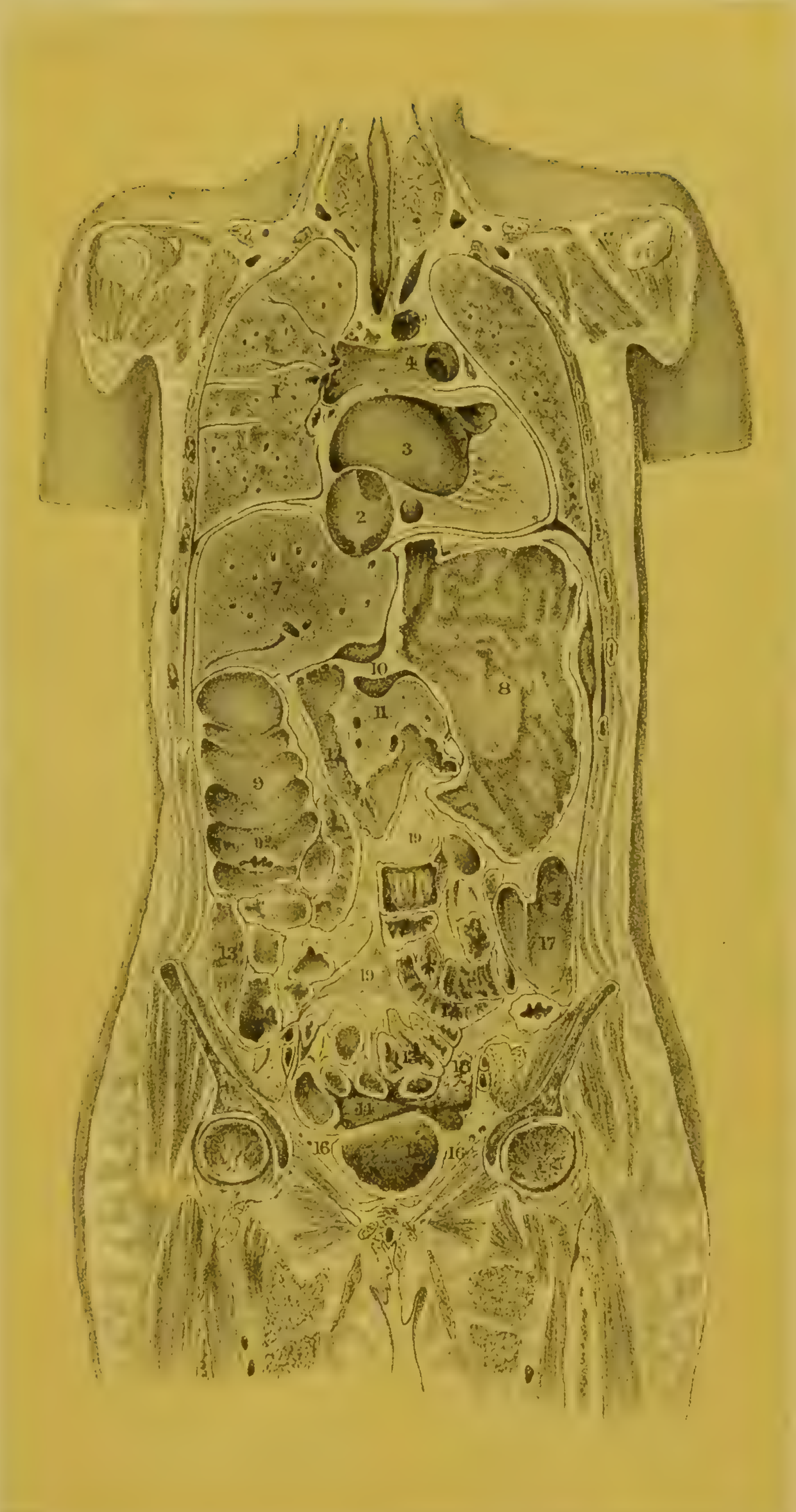
c. The uterus lies normally to the front, but has a range of mobility indicated in fig. 55. The posterior lip of the cervix is 1·5 to 3 cm. above the tip of the coccyx. By digital pressure the uterus can be elevated about 4 cm. (1½ in.).



SURFACE-VIEW OF ABDOMEN AND THORAX; THE SECTION IS SEEN AT PLATE II.

1. Right Hypochondriac.	2. Epigastric.	3. Left Hypochondriac.
4. Right Lumbar.	5. Umbilical.	6. Left Lumbar.
7. Right Iliac.	8. Hypogastric.	9. Left Iliac.

The uppermost line indicates the position of the Diaphragm.



W & A K [illegible]

PLATE II.—CORONAL SECTION OF FROZEN FEMALE CADAVER
(*RUEDINGER*).

CHAPTER III.

THE STRUCTURAL ANATOMY OF THE FEMALE PELVIC FLOOR: THE PELVIC FLOOR PROJECTION.

LITERATURE.

STRUCTURAL ANATOMY. *Hart*—The Structural Anatomy of the Female Pelvic Floor: Edinburgh, 1881.

PELVIC FLOOR PROJECTION. *Foster*—Op. cit. *Schrœder*—Op. cit. Noch ein Wort über die normale Lage und die Lageveränderungen der Gebärmutter: Arch. f. Gynäk., Bd. IX., S. 68. *Schultze*—Op. cit. *Simpson and Hart*—The Relation of the Abdominal and Pelvic Organs in the Female: W. and A. K. Johnston, Edinburgh and London, 1881.

THE STRUCTURAL ANATOMY OF THE FEMALE PELVIC FLOOR.

HITHERTO we have regarded the pelvic floor in detail as made up of bladder, vaginal walls, rectum, connective tissue, and peritoneum. In this chapter we purpose considering it in its structural aspect. In its formation, the following functions have been provided for. As compared with the floor of the male pelvis, the female pelvic floor differs in having in it the cleft known as the vagina. Then further, women have to undergo parturition in which the child is born through the vagina, which is then greatly distended. At the same time a woman has resting on her pelvic floor the same abdominal viscera as the male, and her pelvic floor is also subjected to the same strain from intra-abdominal pressure. Thus we have to explain how the female pelvic floor has been constructed so as to allow of parturition and yet remain strong enough to resist ordinary intra-abdominal pressure. The question is a *structural* or architectural one. We study it in this present chapter just as we would study the structure of a box or chair.

In order to understand this question, we must look at the pelvic floor in sagittal mesial section as at fig. 40. In this view we see the pelvic floor or diaphragm stretching from symphysis pubis to sacrum. The anus is to be imagined closed as in life. The first thing to note is the vagina, which is seen as a cleft running upwards in the pelvic floor from hymen to cervix uteri. Its walls are in close apposition (*vide* figs. *passim*). They are often erroneously represented apart; in order, as it were, to let the student *see* the vagina. This is wrong, however.

It is no more necessary to figure the vaginal walls always apart, than it would be always to sketch a man with his mouth open to render it visible. The first idea one gets on looking at such a section is that, owing to the apposition of the vaginal walls, the pelvic floor in the woman is unbroken; and that the vaginal cleft, the introduction of which does weaken the floor somewhat, cuts the floor not perpendicularly to the horizon but obliquely at an angle of about 60°.

The pelvic floor, as seen in this section, is made up of two segments which are known as the *pubic* and *sacral* segments. It is of importance to define these exactly.

The *Pubic Segment* is made up of loose tissue, viz., bladder, urethra, anterior vaginal wall, and bladder peritoneum. It is attached in front to the symphysis pubis. This attachment is a loose one; the bladder and urethra, meeting one another at right angles, are separated from the pubis by the pyramidal deposit of loose fat already described as the retropubic fat deposit. Note specially that the retropubic fat deposit as seen in this section—that of a woman in the dorsal or the erect posture—is triangular; and that the peritoneum passes from the anterior abdominal wall on to the fundus of the bladder, just a little above the top of the symphysis.

The *Sacral Segment* is attached to the coccyx and sacrum; it consists of rectum, perineum, and strong tendinous and muscular tissue. The inferior portion of this segment, the perineum, lies about 1½ inch from the symphysis.

So far we have described the mesial attachments of the segments. The pubic segment, however, is also attached on each side to the anterior bony pelvic wall, while the sacral segment is attached in a like manner to the posterior bony pelvic wall. Finally, these two segments blend with one another on the right and left sides of the vagina.

The two segments are thus *anatomically* contrasted :—

The pubic segment is made up of loose tissue and is loosely attached to the pubic symphysis; the sacral segment is made up of strong tissue and is firmly dovetailed into the sacrum and coccyx.

They are further contrasted *functionally* :—

The pubic segment is drawn up during labour; the sacral segment is driven down.

The proof for this functional contrast is too elaborate to be given here and will be found given in detail in Dr Hart's atlas. It may be briefly explained, however, that during labour the pubic and sacral segments act like two folding doors. Uterine action pulls up the pubic segment, and drives the child down against the sacral one. This action is analogous to the way one passes out through two folding doors, where he pulls the one door towards him and pushes the other from him.

As the result of this elevation of the pubic segment, the bladder is drawn above the pubis and its peritoneum stripped off (fig. 56).

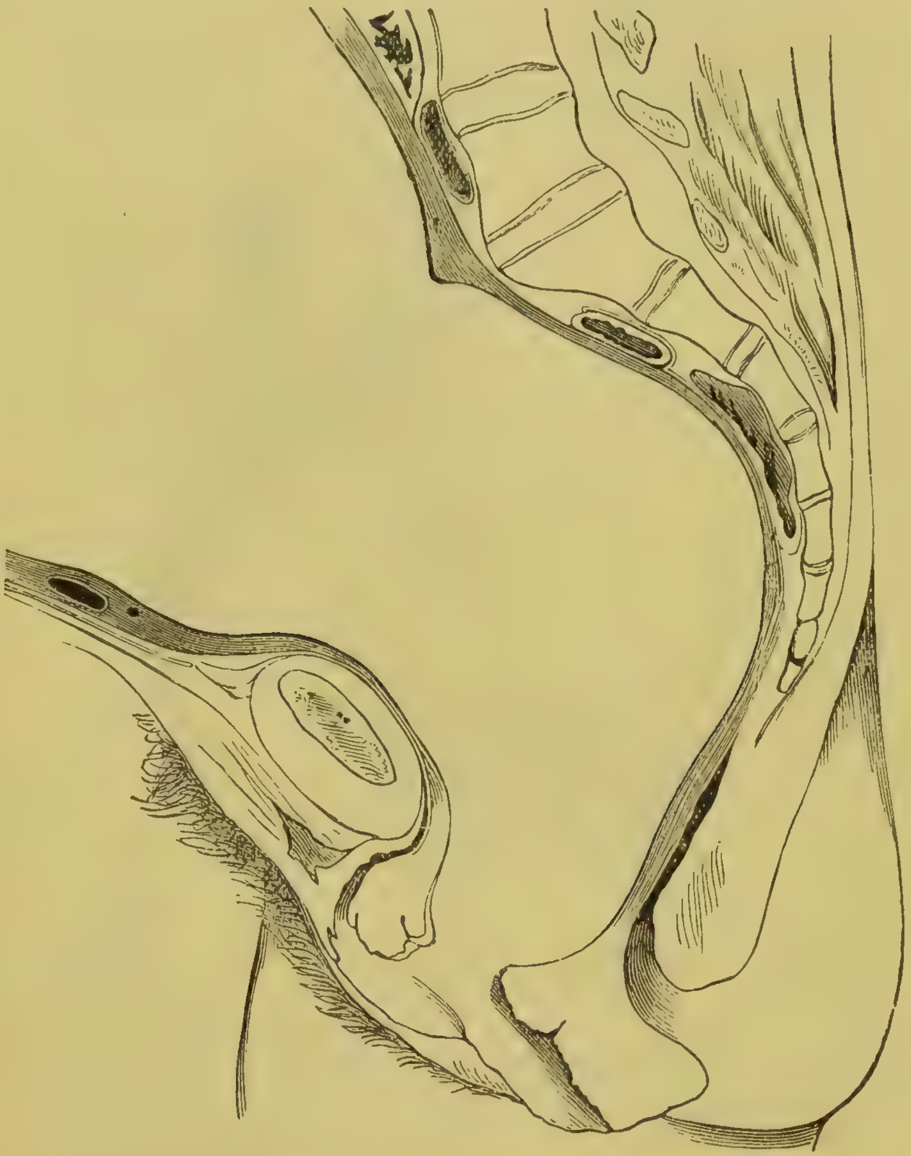


Fig. 56.

Pelvic Floor differentiated in parturition (Braune). The Pubic Segment is drawn up and the Sacral one driven down. Note position of bladder and its peritoneum: for lettered description, see fig. 43.

In addition to the retropubic fat deposit, it should be noted that—

a. The posterior wall of the bladder is *loosely* attached to the anterior vaginal wall;

b. The urethra and anterior vaginal wall are *closely* blended;

c. The posterior vaginal wall and anterior rectal wall are *loosely* connected, as far down as the apex of the perineal body (fig. 35).

There are three lines of cleavage in the pelvic floor (fig. 57).

1. Physiological, between the vaginal walls; all in front of this line is drawn upwards in parturition.
2. Pathological, between the posterior vaginal and anterior rectal walls; all in front of this is displaced downwards in Prolapsus uteri.
3. Bimanual, between the anterior and posterior rectal walls; all in front of this is displaced on bimanual recto-vaginal examination.

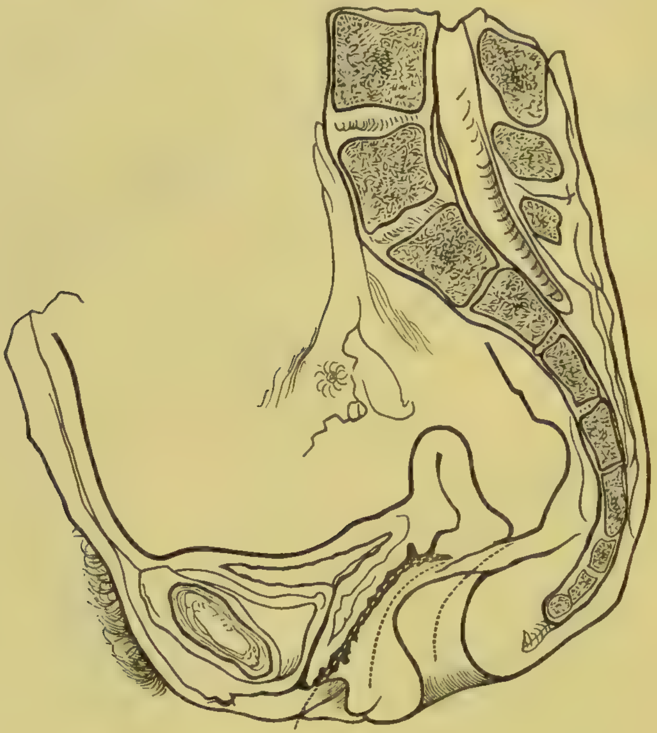


Fig. 57.

Lines of cleavage indicated by dotted lines. From before backwards they are—1. Physiological; 2. Pathological; 3. Bimanual (Hart).

From the structural arrangement of the pelvic floor, it results, as will be shown more fully afterwards, that—

1. There is a definite opening up of the pelvic floor during parturition and when a woman assumes the genupectoral posture with the vaginal orifice opened up;
2. There are produced definite displacements of the pelvic floor when the various specular means of exploring it are employed and under excessive intra-abdominal pressure or hypertrophic growths of the cervix.

The nomenclature employed should be noted. It is better to speak of the pubic segment being separated from the sacral one than of the vaginal walls being apart. The vaginal walls are not special structures. The anterior vaginal wall is the posterior boundary of the pubic segment; the posterior vaginal wall is the anterior boundary of the sacral segment. Thus they are analogous to the *edges* of two folding doors. We shall refer to this again under prolapsus uteri and examination with the Sims' speculum.

The question of the support of the uterus is still disputed. The broad and round ligaments have nothing to do with its support; they are only useful as giving fixed points for the contracting uterine muscle during parturition. The utero sacral ligaments, however, probably help in supporting the uterus.

Many allege most erroneously that the vagina supports the uterus, as if the vagina were a special structure. *The chief support is the compact unbroken pelvic floor*, on which the uterus rests just as one sits on a chair. It is the whole pelvic floor that supports the uterus and viscera, not the perineum alone. The perineum is only a small though strong part of the sacral segment.

The various components of the pubic segment are definitely displaced in its movements. Thus the retropubic fat is—

1. Behind the pubis in the nonparturient female (fig. 52);
2. Above it in the parturient female (fig. 56);
3. Below it in prolapsus uteri;
4. Below it in the extra pelvic floor projection of pregnancy;
5. Partially above the symphysis in the genupectoral posture (fig. 65).

The peritoneum is—

1. Reflected on to the top of the empty bladder in the nonparturient female;
2. Stripped off the bladder during parturition;
3. Reflected on to fundus of empty bladder, at a higher level above symphysis, in the genupectoral posture.

Thus the peritoneum over the bladder is movable; the peritoneum over the sacral segment is fixed.

It will now be seen that the structural problem stated at the beginning of the chapter is solved thus. The sacral segment, strengthened at its tip by the perineum, is the supporting one; it holds the pubic segment, just as the hand at fig. 58 holds the pessary. The anterior margin of the sacral segment stops short of the pubis by about 1½ inches, and this interspace is filled up by the pubic segment. Intra-abdominal pressure presses the pubic segment against the oblique sacral one which closes the pelvic outlet, therefore, like a valve; excessive intra-abdominal pressure displaces, in prolapsus uteri, a definite part of the pelvic floor in front of the anterior rectal wall.

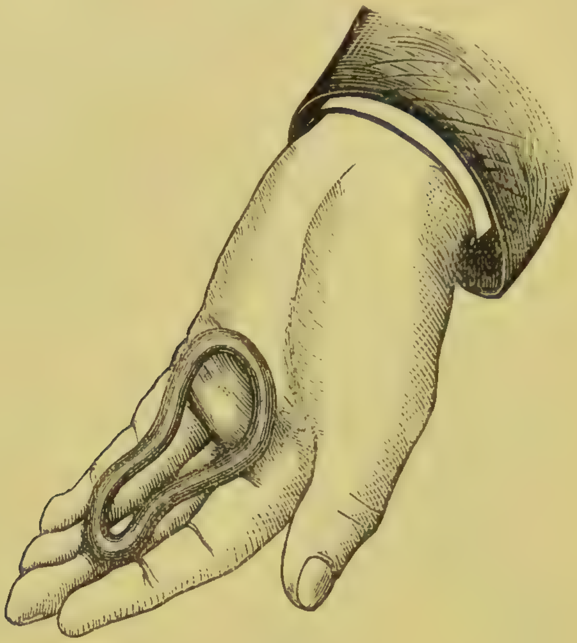


Fig. 58.
Hand holding Pessary.

PELVIC FLOOR PROJECTION.

By this is understood the amount of projection of the pelvic floor, in sagittal mesial section, *beyond the straight line joining the tip of the coccyx and the subpubic ligament—conjugate of outlet* (fig. 59).

Definite results have not as yet been obtained, but this is one special reason why attention should be directed to it.

Schroeder measured the conjugate at the outlet with callipers; and then passed a measuring line from the coccyx to the apex of the pubic arch, the tape following the curve of the pelvic floor. The subjoined table gives some of his results.

	Distance from tip of coccyx to lower border of symphysis.	
	By Tape Measure.	By Callipers.
Average of the pregnant women	c.m. 13·35	9·15
,, ,, gynecological patients	,, 12·6	8·27
,, ,, nulliparæ	,, 13·2	8·75

Schroeder's deduction is that the average projection of the pelvic floor beyond the plane of the pelvic outlet is 4·1 c.m. There is no doubt that this is an excessive average, as may be seen by consulting the pelvic sections in Schroeder's manual.

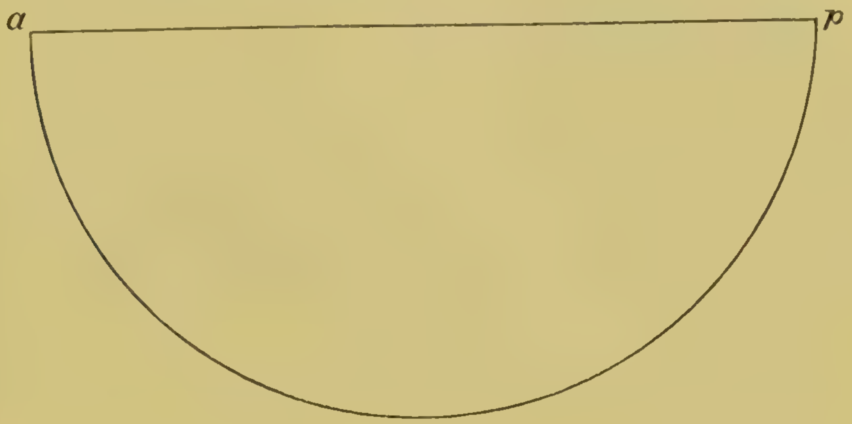


Fig. 59.

Diagram to show what is meant by pelvic floor projection. *a p*=conjugate of outlet. A perpendicular bisecting *a p* and cutting the arc gives the greatest pelvic floor projection (F. P. Foster).

F. P. Foster of New York has written ably on this subject and made a large series of observations. Fig. 60 shows the callipers he employed. An end of each limb (*a* and *b*) is placed on the tip of the coccyx and lower border of the symphysis pubis. The horizontal bar between these limbs is graduated in c.m., and the limb (*a*)

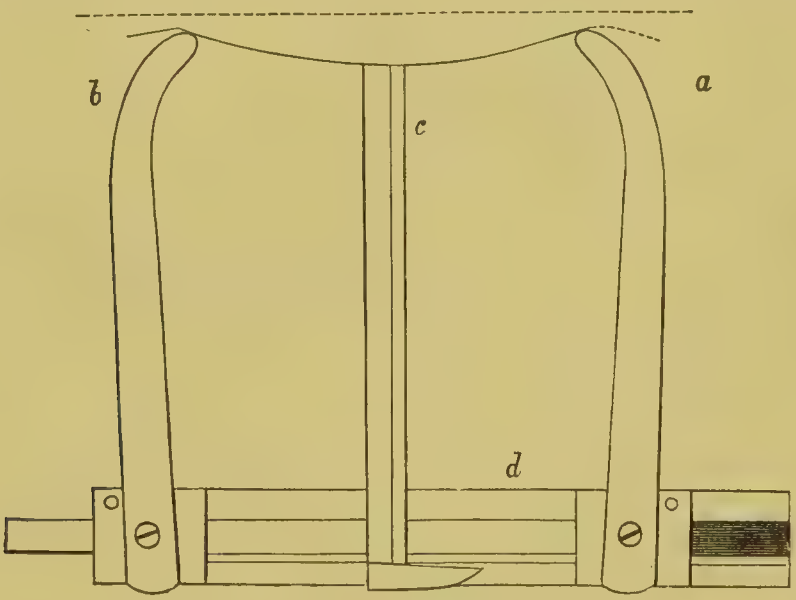


Fig. 60.

Callipers for measuring pelvic floor projection (Foster).

glides along it in a groove. A moveable upright (*c*), also graduated, has its upper point placed against the most projecting part of the pelvic floor. If now the whole apparatus be removed and laid flat on a sheet of paper, the conjugate and amount of projection can be read off at once. Greater accuracy is ensured by noting, before removing the apparatus, the point on the transverse bar at which the upright (*c*) stands as well as the reading which it gives.

Foster's average (2·5 c.m.) of the pelvic floor projection is less than Schroeder's. He placed his patient semiprone, however ; a position in which the pelvic floor projection is slightly diminished. Fig. 61 shows Foster's diagram of pelvic floor projection. The uterus has been more anteverted than in Foster's original drawing.

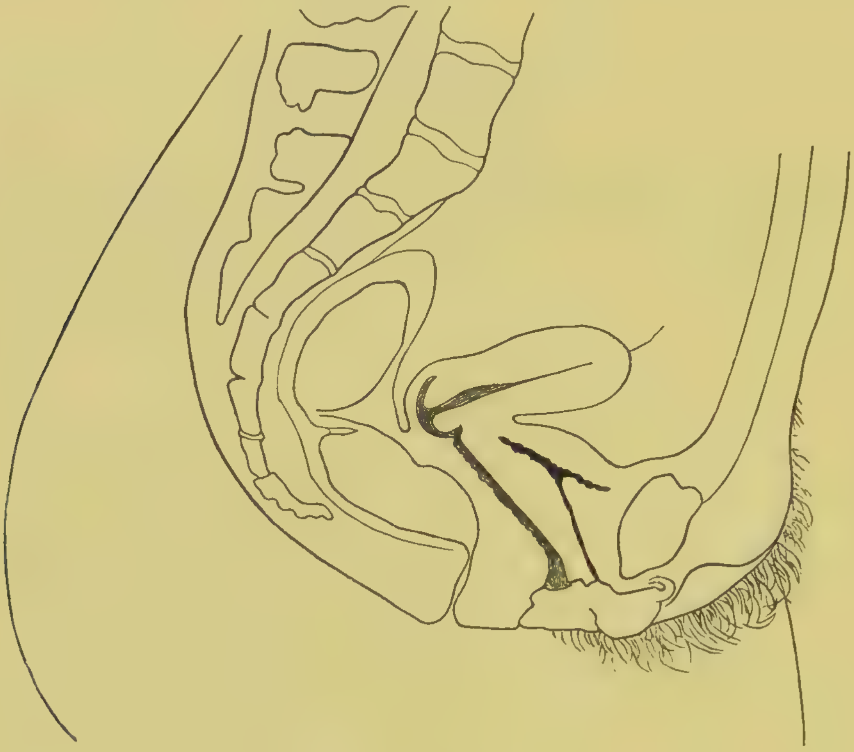


Fig. 61.

Diagram of pelvic floor projection and position of uterus, modified from Foster.

Measurements made on frozen sections cannot be trusted. Schroeder has justified his average by such measurements, but has taken no account of the existence of pregnancy in some of the cases.

We might tentatively advance the following statements :—

(1.) The pelvic floor projection is over-estimated by Schroeder

(2.) Foster's and Schultze's average is nearer the mark ;

(3.) The retropubic fat gives a rough index of the position of the pubic segment. (Figs. 41, 42, 50);

(4.) The pelvic floor projection is increased by advanced and even by early pregnancy (Braune's Plates).

The whole enquiry needs further investigation in order to settle also other points, among which we may mention the relation of the vagina to the pelvic outlet and the varying amount of pelvic floor projection in different postures.

CHAPTER IV.

THE BLOODVESSELS, LYMPHATICS, AND NERVES OF THE PELVIS: DEVELOPMENT OF PELVIC ORGANS.

LITERATURE.

BLOODVESSELS. *Hyrtl.*—Die Corrosions-anatomie und ihre Ergebnisse, W. Braumüller: Wien, 1873. *Henle*—Op. cit. *Klein and Smith's* Atlas. *Luschka, Quain, Sappey, Savage*—Op. cit.

LYMPHATICS. *Bourgery and Jacob*—Traité Complet de l'Anatomie de l'Homme : Paris, 1839. *Championnière*—Lymphatiques Utérines et Lymphangite Utérine : Bull. de la Soc. Med. des Hôpitaux de Paris, Vol. VII. *Klein*—The Anatomy of the Lymphatic System : London, 1873. *Le Bec*—Op. cit. *G. Leopold*—Die Lymphgefässe des normalen nicht schwangeren Uterus : Archiv. für Gynäk., Bd., VI., S. 1. *W. T. Lusk*—Puerperal Fever : International Congress Tr., Philad., 1877. *Sappey, Savage,*—Op. cit.

NERVES. *T. Snow Beck*—The Nerves of the Uterus : Phil. Tr., 1846. *Flower*—Diagrams of the Nerves of the Human Body : J. and A. Churchill, London, 1872. *Frankenhaüser*—Die Nerven der Gebärmutter und ihre Endigung in den glatten Muskelfasern : Jena, 1867. *R. Lee*—The Anatomy of the Nerves of the Uterus : London, Baillière, 1841. *Tiedemann*—Tabulæ Nervorum Uteri : Heidelberg, 1822.

DEVELOPMENT OF THE PELVIC ORGANS. *Foulis*—The Development of the Ova, and the Structure of the Ovary in Man and the other Mammalia : Tr. R. S., Edin., Vol. XXVII. *Klein and Smith, Quain, Turner*—Op. cit.

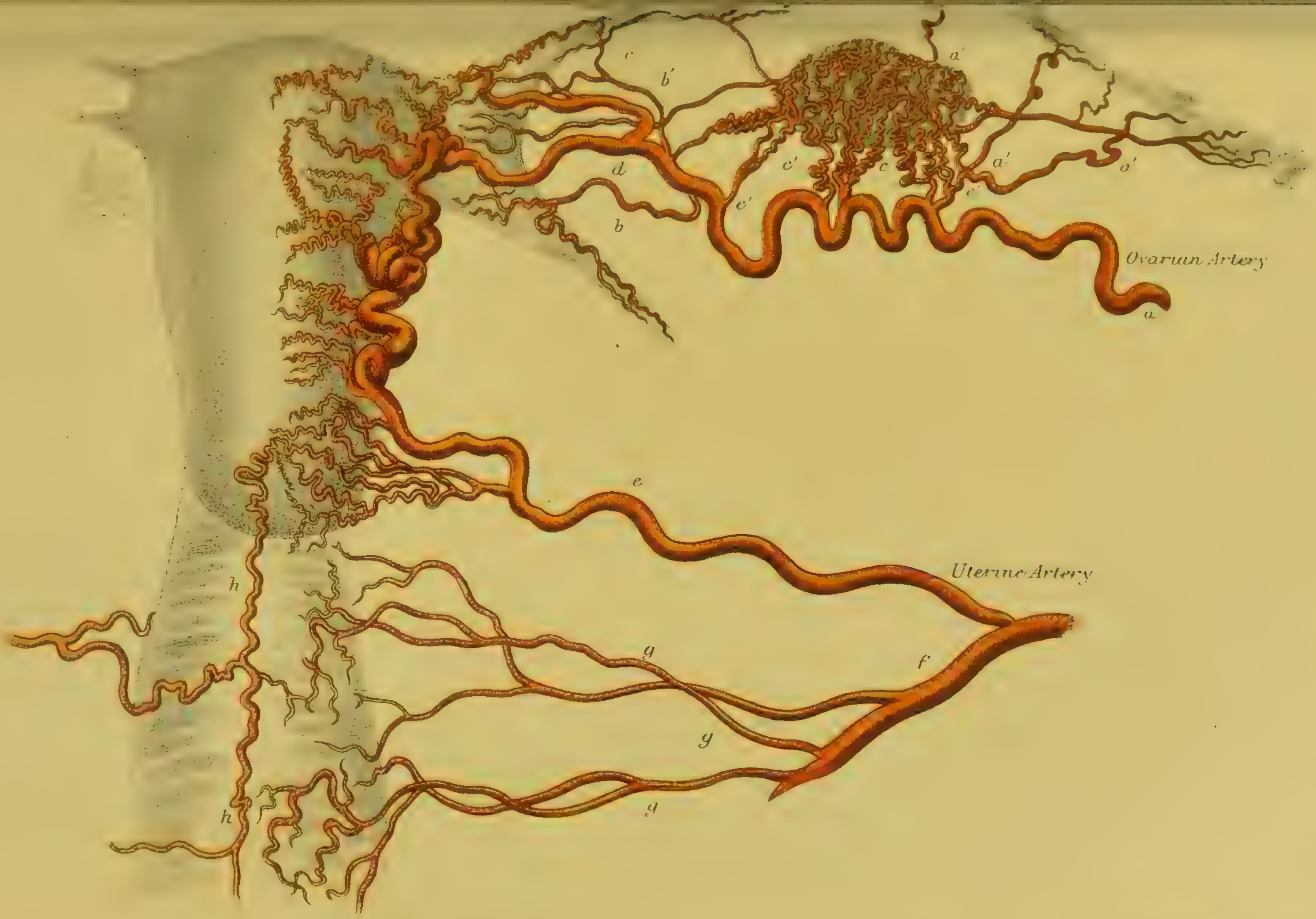
BLOODVESSELS.

WE consider (1.) the arterial supply of the uterus, ovary, Fallopian tube, vagina, bladder, and rectum ; (2.) that of the perineal region ; (3.) the venous distribution.

(1.) *Arterial supply to uterus, ovary, etc.*—The *Ovarian artery* of each side (corresponding to the spermatic of the male) is a branch of the abdominal aorta. Its relations when in the abdomen do not concern us here. In the pelvis it passes between the layers of the broad ligament, running tortuously towards the upper angle of the uterus. Near this it divides into two branches. The upper supplies the fundus uteri ; the lower anastomoses at the side of the uterus with the uterine artery (Plate III. *c*, *d*).

The Ovarian Artery gives off—

Branches to the ampulla of the Fallopian tube (Plate III. *a′ a′*).



DISTRIBUTION OF OVARIAN, UTERINE, AND VAGINAL ARTERIES (HYRTL).

Branches to the isthmus (b'),
Numerous branches to the ovary (c' c' c'),
Branch to the round ligament (b).

The *Uterine Artery* (plate III. *e*) springs from the anterior division of the internal iliac and passes downwards and inwards towards the cervix uteri. It then passes upwards between the layers of the broad ligament by the side of the uterus, in an exceedingly tortuous manner well shown in plate III., to anastomose with the lower branch of the ovarian. Branches pass from it into the substance of the uterus; these are the curling arteries of the uterus. The *Vaginal arteries* (*g g g*) usually spring immediately from the anterior division of the internal iliac artery, but sometimes arise from the uterine or middle hæmorrhoidal. A special branch of the uterine artery to the cervix joins with its fellow at the isthmus to form the circular artery, and with those of the vagina to form the azygos artery of the vagina (*h h*). The vaginal arteries anastomose freely with those of the opposite side. Plate III., from Hyrtl, illustrates beautifully the free anastomosis of branches of the aorta with the ovarian, uterine, and vaginal arteries. It should be noted that, in an operation for removal of the uterus, ligature of the broad ligament controls all hæmorrhage.

From the same anterior division of the internal iliac, proceeds the blood supply to the bladder and rectum.

(2.) *Arterial supply* to the perineal region.—This comes from the internal pudic. The superficial perineal branch supplies the labia; the artery to the bulb supplies the bulbus vaginæ; the terminal branches go to the clitoris.

(3.) *Venous supply.*—The venous supply of the pelvis is very abundant, and exists in the form of numerous plexuses freely communicating with one another. The veins are unprovided with valves. Hæmorrhage from a wound is therefore often exceedingly profuse, especially during pregnancy when the whole pelvic vascular system is hypertrophied.

The following is a summary of the main facts as to the venous supply of the female pelvis.

The *vesical plexus* lies external to the muscular coat of the bladder. The *hæmorrhoidal plexus* lies below the mucous membrane of the lower part of the rectum.

The veins of the labia correspond in distribution to the arteries, and those from the outermost parts drain into the pudic which opens into the common iliac vein. Large veins from the labia minora open into the pars intermedia of the bulb.

The veins from the glans and corpora clitoridis pass into the dorsal vein of the clitoris, which communicates with the vesical plexus.

The veins of the bulb pass into the vaginal plexus.

The *vaginal plexuses*—one outside the muscular coat and one in the submucous tissue—are most abundant at the lower part of the vagina,

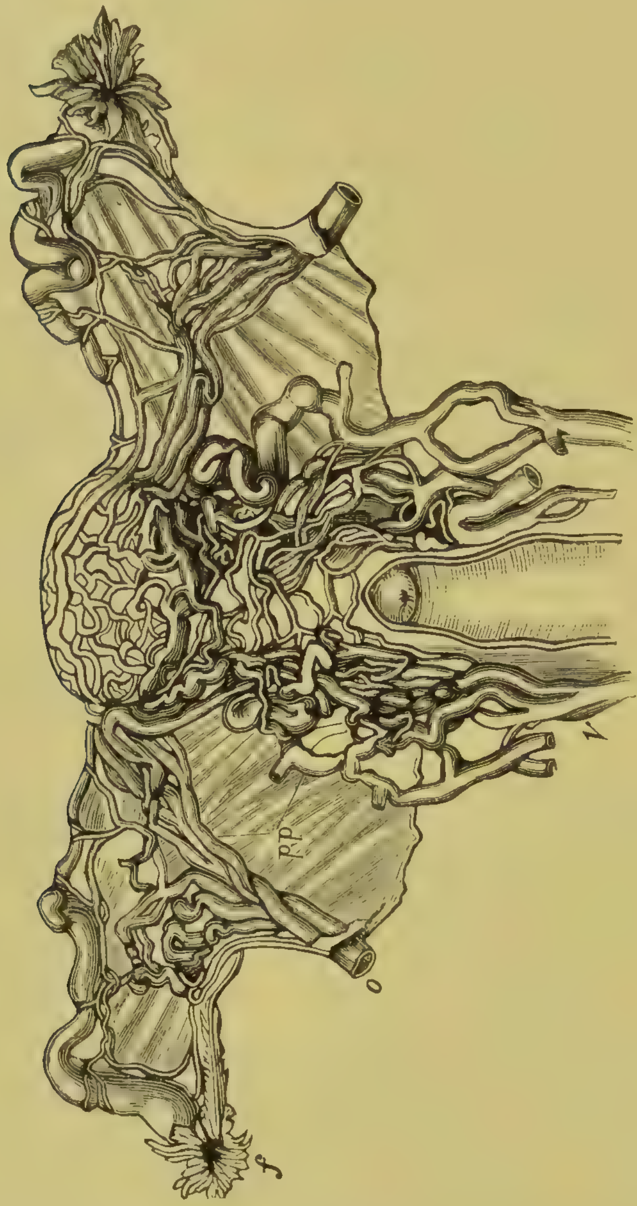


Fig. 62.

Uterus and vagina with their venous supply, seen from behind—(Luschka). *f* Fallopian tube; *pp* pampiniform plexus.

communicate with the hæmorrhoidal and vesical plexuses, and open into the internal iliac vein.

The *uterine plexus* is very abundant, as is well shown in one of

Hyrtl's plates; it ultimately opens into the ovarian veins (fig. 62), which pass, on the right side to the inferior vena cava, on the left to the left renal vein. The veins are small, lie in the outer muscular coat, and run longitudinally; they open into large sinuses in the middle layer of that coat, with which the capillary vessels communicate.

The *ovarian* plexus, otherwise known as the pampiniform plexus, lies between the folds of the broad ligament and communicates with the uterine plexus (fig. 62). Some apply this term to all the veins in the broad ligament. The ovarian plexus opens into the inferior vena cava.

Beneath the peritoneum and between the layers of the broad ligaments are vast venous plexuses. Knowledge on this point is of the highest importance in relation to pelvic hæmatocele.

The vesical, hæmorrhoidal and vaginal plexuses, with the pudic veins, open into the internal iliac vein which opens into the inferior vena cava.

From the hæmorrhoidal plexus, the superior hæmorrhoidal vein passes into the portal system; and thus we get a communication between the pelvic and portal venous systems.

LYMPHATICS.

Under this we take up—

a. The Lymphatic Glands;
b. The Lymphatic Vessels.

a. The Lymphatic Glands.—These are (1.) the *inguinal glands,* which lie parallel to and just below Poupart's ligament; and (2.) the *pelvic glands.* These latter consist of (*a*) a gland at the isthmus uteri (Championniére); (*b*) hypogastric glands, which lie subperitoneally in the space between the external and internal iliac vessels; (*c*) sacral, on the lateral aspect of the anterior surface of the sacrum and in the mesorectum; and (*d*) a gland or collection of small glands at the obturator foramen —the obturator gland of Guérin. These all pour into the lumbar glands, which lie in front of the lumbar vertebrae and discharge into the thoracic duct.

b. The Lymphatic Vessels. (1.) *Of External Genitals.*—Numerous vessels form a network on the internal aspect of the labia majora, over the labia minora and round the vaginal and urethral orifices, vestibule and clitoris; all of these open into the inguinal glands. From this arrangement, the enlargement of the inguinal glands in syphilis and vulvar cancer is intelligible. The lymphatics of the *lower fourth of the vagina* also open into these glands.

(2.) *Of Vagina (upper three-fourths) and Cervix Uteri.*—The lymphatics from these open into the hypogastric glands. So far we have followed Sappey's description.

Le Bec asserts that the lymphatics of the vagina pour into a series of trunks at the level of the isthmus uteri and that those of the cervix join them; and that the conjoined lymphatics then pass below the base of the broad ligament to the obturator ganglion, from which vessels communicate with others from the thigh and even from the epigastrium.

The relation between lymphatics and glands is as follows:—

(*a*) Those of the external genitals pass into the inguinal glands.

(*b*) The lymphatics of the vagina and cervix pass to the hypogastric glands (Sappey). According to Le Bec, they pass to the obturator gland.

(3.) *Of Uterus.*—The lymphatics of the body of the uterus pass through the broad ligaments, and, along with those from the ovary and Fallopian tube, enter the lumbar glands. If Le Bec be right, the lymphatics from the cervix pass *below* the broad ligament, and those from the uterus along the *upper* part of the same.

Leopold, who has investigated the lymphatics in the unimpregnated uterus, considers "the mucous membrane of the uterus as a lymphatic surface which contains no special lymphatic vessels, but consists of lymph sinuses covered with endothelium." "The lymph passes from the lymphatic spaces of the mucous membrane, through the mucous membrane hollows, into the lymph spaces and vessels of the muscular coat, surrounds here all the bundles up to the serous covering, and flows into the larger vessels which enter the broad ligament in the neighbourhood of the vessels." (Loc. cit. S. 31.)

These are matters not of mere anatomical detail, but of the very highest pathological and practical importance. The richness of lymphatic supply to the vagina, cervix, and uterus explains the extraordinary rapidity with which septic matter spreads through the body, and the extreme danger which may attend even an insignificant lesion of the internal genital organs, when septic matter is present and is absorbed. We may remark here that septic matter will of course follow the lymphatic routes already laid down. It should not be forgotten, however, that the bacteria passing along the lymphatic vessels may penetrate them, pass into the peritoneal cavity, and thence spread through the diaphragm to set up the pleurisy and pericarditis so common in septicæmia (Lusk). Thorough comprehension of lymphatic distribution and knowledge of the evil effects of septic matter are of the first importance to the student.

The lymphatics of *the Rectum* lie in two layers (mucous and muscular), and open into the glands of the mesorectum or into the sacral glands.

The stomata of the peritoneum of the pelvis communicate with lymph capillaries lying in the subendothelial tissue.

NERVES.

These are (*a*) Spinal, (*b*) Sympathetic.

(*a*) *Spinal.*—The following is the nervous supply of the pelvic muscles:—

Levator and Sphincter ani are supplied by inferior hæmorrhoidal branch of pudic, 4th and 5th sacral, and coccygeal nerves;

Coccygeus, by 4th and 5th sacral and coccygeal nerves;

Muscles of Perineum and Clitoris, by the branches of pudic nerve.

(*b*) *Sympathetic.*—The hypogastric plexus, which lies between the common iliac arteries, gives off branches which, reinforced by branches from the lumbar and sacral ganglia and sacral nerves, form the *inferior hypogastric plexuses*—one on each side of the vagina. From these, filaments proceed to the vagina, uterus, Fallopian tube, and ovary.

The terminations of the nerves in the muscular layers of the uterus have been studied by Frankenhaüser, who figures them passing to the nuclei of the unstriped muscle. Those entering the mucous membrane are said to end in ganglia. Numerous end bulbs have been found in the clitoris and vagina.

DEVELOPMENT OF PELVIC ORGANS.

The following is a very brief summary:—

The *Wolffian bodies* appear in the fœtus about the third and fourth week. They fulfil the function of kidneys until the second month, and then wither.

The *Fallopian tubes*, *uterus* and *vagina* are derived from the Ducts of Müller. These appear on the anterior aspect of the Wolffian bodies. Their lower portions coalesce to form the uterus and vagina; while, above, they remain separate, as the Fallopian tubes.

The *ovary* first appears as a thickening on the Wolffian bodies. It is made up of interstitial tissue projecting from them and covered by epithelium—the germ epithelium. According to Foulis, the ova are developed from the latter; the cells of the membrana granulosa are formed from the connective corpuscles of the interstitial tissue. Waldeyer believes that the ova and the cells of the membrana granulosa both originate from the germ epithelium; and in this Balfour agrees with him (*vide* chap. on Ovarian Tumours).

The *parovarium* arises as a small distinct structure at the summit of each Wolffian body. It persists in the female (fig. 22). In the male it forms the epididymis.

The *clitoris* developes from a small eminence at the front of the urogenital sinus.

Up to the second month of fœtal life the genital urinary and intestinal ducts open into the cloaca, which then becomes divided by a transverse partition into a posterior anal, and anterior urogenital sinus. The *vestibule* in the adult female is simply the lower part of the latter sinus.

The *labia minora* result from the non-coalescence of folds analogous to those which, by their coalescence, form in the male the corpus spongiosum urethræ.

The *labia majora* are two folds which remain separate in the female but coalesce in the male to form the scrotum.

The *two bulbi vaginæ* are homologous to the corpus spongiosum urethræ.

For fuller details see Turner and Quain.

CHAPTER V.

PHYSICS OF THE ABDOMEN AND PELVIS, WITH SPECIAL REFERENCE TO THE SEMIPRONE AND GENUPECTORAL POSTURES.

LITERATURE.

W. *Braune*—Die Oberschenkelvene des Menschen in Anatomischer und Klinischer Beziehung: Leipzig, Veit and Co., 1871. *J. M. Duncan*—On the Retentive Power of the Abdomen: Researches in Obstetrics, p. 409. *Hart*—The Structural Anatomy of the Female Pelvic Floor. *Simpson and Hart*—The Relations of the Abdominal and Pelvic Organs in the Female. *Schatz*—Beiträge zur physiologischen geburtskunde: Archiv. für Gynäk., Bd. IV., S. 191. Einfluss der Lehre vom intraabdominalen Drucke auf die Gynäkologie: Archiv. für Gynäk., Bd. V., S. 227. *Van de Warker*—A Study of the Normal Movements of the Unimpregnated Uterus: N. Y. Med. Jour., Vol. XXI., page 337.

In this chapter it is proposed to give a brief sketch of a subject of the highest importance but still in its infancy. The *resumé* must be restricted, from want of space, to certain practical points; we therefore consider here—

1. *The effect of intra-abdominal pressure on the female pelvic floor;*
2. *The results brought about by change of posture, especially by the genupectoral posture;*
3. *The effect on uterine position of digital pressure in the vaginal fornices.*

THE EFFECT OF INTRA-ABDOMINAL PRESSURE ON THE FEMALE PELVIC FLOOR.

We suppose the woman to be in the upright posture. For simplicity the pelvic floor is considered as being under fluid pressure. Fig. 63 shows the effect of this on the pelvic floor segments. The fluid pressure acts at right angles to the limiting surface which, in this case, is the pelvic peritoneum. Thus, if the perpendiculars be counted, starting from the symphysis, it can readily be seen that the first three will press the pubic segment against the symphysis; that the fourth and fifth will do this also, but will further have a resultant tending to drive the pubic past the sacral segment; that the sixth and seventh will, directly, tend to do this; and that the others will drive it partly past the sacral segment, and partly against it. From want of rigidity in the pubic segment, this driving down tendency is partly lost. Thus the effect of ordinary intra-abdominal pressure is to press the pubic against the sacral segment. Extra intra-abdominal pressure displaces downwards a definite portion of the pelvic floor—viz., all lying in front of the anterior rectal wall. There is in the pelvic floor a definite line of cleavage at which it yields, which line runs between the anterior rectal and posterior vaginal walls (see p. 58).

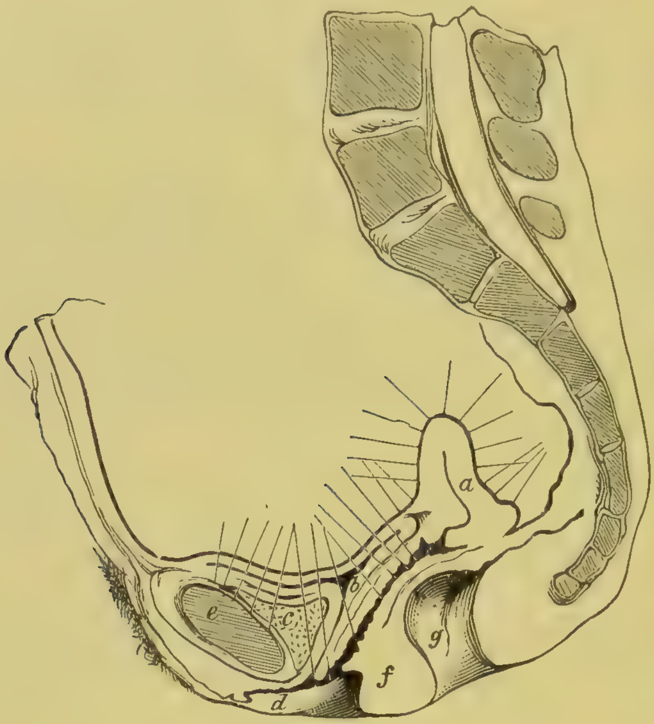


Fig. 63.

Diagram to illustrate effect of intra-abdominal pressure on the segments of the pelvic floor (*Hart*) *a* Uterus pathologically anteflexed; *b* Bladder; *c* Retropubic fat; *d* Labium majus; *e* Symphysis. *f* Perineal body; *g* Rectum.

This definite downward displacement causes the lesion known as prolapsus uteri.

From this we see that the female pelvic floor is not equally strong throughout. It would be, were the sacral segment prolonged and attached to the symphysis pubis. But then parturition would have been an impossibility. It has been constructed not only *quâ* intra-abdominal pressure, but also *quâ* parturition.

THE RESULTS BROUGHT ABOUT BY CHANGE OF POSTURE, ESPECIALLY BY THE GENUPECTORAL POSTURE.

The abdominal walls, along with the viscera bounded by them, are often spoken of as the abdominal cavity with its contained viscera. We must, however, keep in mind that this cavity is always perfectly full. There is never any vacuum in it. The viscera are always in apposition, with only a little fluid as a film separating them. The abdominal walls are yielding, and any tendency to a vacuum is counteracted by atmospheric pressure on the walls. The vertical height of the abdomen is too small to admit of a Torricellian vacuum; and therefore it is no more wonderful that we have no vacuum in the abdominal cavity, than that there is no vacuum in an ordinary test-tube filled with water and with its open end immersed. There would be a vacuum if the test-tube were above 33 feet long; and so would there be in a race of giants, the vertical height of whose abdominal cavity was such that the column of contained viscera could not be counterpoised by the atmospheric pressure. In no posture a woman can assume is there ever a vacuum in the abdominal cavity. However high the pelvis be, though the woman stand on her head, the small intestines still touch the uterus as they do in fig. 47 and Plate II. The abdominal walls and viscera enclosed by them behave, therefore, like a plastic viscous fluid—like so much thick gum or treacle.

When a woman is in the *upright posture,* the viscera bulge above the symphysis pubis, more or less, according to her development. The frontispiece shows this bulging in a well-formed nude female; the bulging is excessive if the woman is fat. Just below the sternum, the antero-posterior diameter of the abdomen is lessened. The pelvic floor is convex as seen from without, *i.e.*, the pelvic floor projection is well marked. Atmospheric pressure is acting equally all over the abdominal and pelvic surfaces; but the pelvic floor, bearing the weight of the

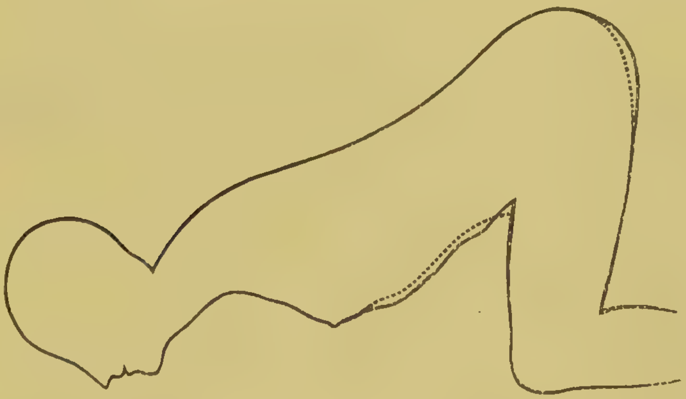


Fig. 64.

Outline of Female Figure in genupectoral posture. The dotted line indicates the contour when the vaginal orifice is unopened; the continuous line, the change in contour after air is admitted into the vagina (Simpson and Hart).

viscera, bulges more than the other boundaries of the abdomen. A fluid contained in a bag suspended from a fixed point is pyriform, with the bulb nearer the earth. This shape is due to the weight of the fluid.

If a woman be made to assume the *posture* known as the *genupectoral* (better *genufacial*), the bulge of the viscera is at the sternum. The following points should be noted in regard to this posture (fig. 64).

1. The antero-posterior diameter of the abdominal cavity is increased at the sternum.
2. It is diminished above the pubis and in the iliac fossæ.
3. The pelvic floor projection is diminished.
4. The pubic and sacral segments are still in contact, and the abdominal viscera always in contact with the uterus and one another.

Let us now contrast these postures.

Upright posture (Plate I.).	*Genupectoral posture* (fig. 64).
1. Greatest antero-posterior (*a-p*) diameter of abdomen just above pubis.	1. Greatest antero-posterior diameter at sternum.
2. Least *a-p* diameter at sternum.	2. Least *a-p* diameter below pubis.
3. Pelvic floor projection at its maximum.	3. Pelvic floor projection diminished.
4. Pelvic floor segments in contact.	4. Pelvic floor segments in contact.

In the latter posture, on inspection of the genitals the labia can be seen to be furrowed and the skin over the ischiorectal fossa slightly hollowed. If now the labia majora and minora be separated and the fourchette lifted up, no further change as yet takes place: but when the hymen is opened up, air passes into the vagina (often with a distinct hiss) and the vaginal walls become separated enclosing a somewhat large cavity. The bulge at the sternum is now slightly increased, while that above the pubis is diminished (see fig. 64). *It is only when the anatomical entrance of the vagina* (*the hymeneal orifice*) *is opened up, that the vagina distends with air.*

It has been shown by Drs Russell Simpson and D. Berry Hart, that the segments of the pelvic floor separate from each other when a woman assumes the genupectoral posture and the hymeneal orifice is opened. The pubic segment passes down with the viscera; the sacral segment remains behind, recoiling slightly upwards. *Thus functionally, the pubic segment is visceral, the sacral one is vertebral.*

They have shown further that there is quite a definite displacement of the pubic segment constituents, viz.:—

a. The empty bladder is partly above the pubis;

b. The peritoneum passes from abdominal wall to symphysis, at a point 1½ inches above the latter;

c. The retropubic fat is partly above and partly below the top of the symphysis. We may now once more contrast these postures.

Upright posture (Plate I.).	*Genupectoral posture* (with vagina distended by air) (fig. 65).
1. Pubic and sacral segments in apposition and vagina a slit.	1. Pubic and sacral segments separated and vaginal walls bounding a cavity.
2. Retropubic fat behind pubis.	2. Retropubic fat partly above pubis.
3. Empty bladder behind pubis.	3. Empty bladder partly above pubis.
4. Peritoneum passes from anterior abdominal wall to fundus of empty bladder, immediately above symphysis.	4. Peritoneum passes from anterior abdominal wall to fundus of empty bladder, 1½ inches above symphysis.
5. Urethra and bladder meet at a right angle.	5. Urethra and bladder almost in same line.

The reason why the pubic segment passes downwards when the vaginal orifice is opened, is that atmospheric pressure now acts on the vaginal aspect of the pubic segment (with its weak mesial attachment to the pubis) and drives it further down. As the result of this posture, changes take place in the length and direction of the vaginal walls and in the position of the uterus. These are briefly :—

1. *Vagina.*—(*a.*) Both walls elongate.
    (*b.*) The anterior follows the direction of the posterior aspect of the symphysis; the posterior, the curve of the sacrum.
2. *Uterus.*—(*a.*) The normally placed uterus passes nearer the sacrum and nearer the thoracic diaphragm.
    (*b.*) The retroverted uterus, fixed or unfixed, becomes more retroverted.
    (*c.*) The retroverted unfixed uterus does not become replaced so as to lie anteverted.

The results given have been obtained as follows :—

a. By observation on living patients, aided by silhouettes of the outlines of the nude body in the upright and genupectoral postures;

b. By study of frozen sections of the female pelvis, and especially by study of a frozen section of a cadaver placed in the genupectoral posture.

For further details on this subject Simpson and Hart's atlas may be consulted.

An important practical result follows from these observations. *The vagina dilates or, more properly, the segments of the pelvic floor separate exposing their free margins—the vaginal walls—when a patient assumes the genupectoral posture and the hymeneal orifice is opened so as to admit air.* If a patient be so placed opposite a good light and the sacral segment be hooked up, a complete view of the vaginal walls and cervix is obtained. The same results can be got by placing the patient in the

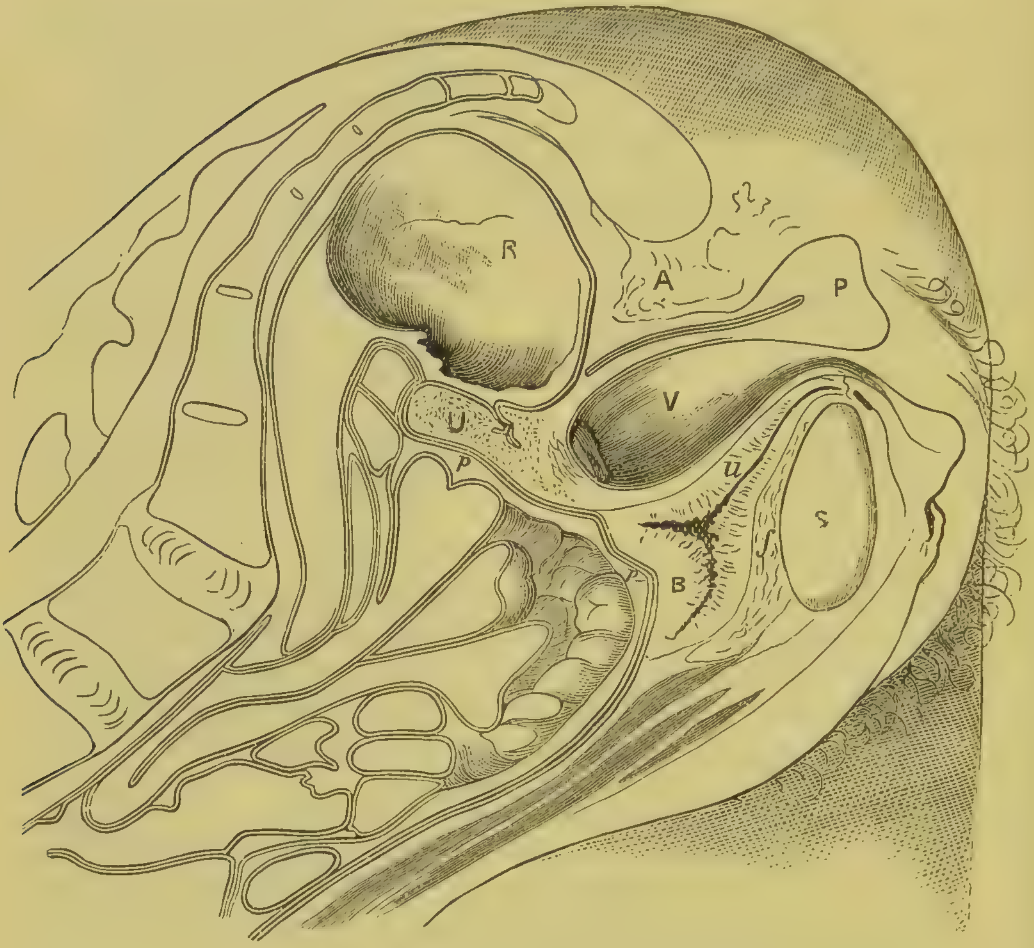


Fig. 65.

Pelvis in frozen section of cadaver in genupectoral posture. *A* anus; *P* perineum; *R* rectum; *V* vagina; *u* urethra; *B* bladder; *S* symphysis; *f* retropubic fat; *U* retroverted uterus; *pp* peritoneum. Between the small intestine and peritoneum is fatty omentum (Simpson and Hart).

posture known as the *semiprone*. On this last fact is based the use of the vaginal speculum known as Sim's Duckbill speculum (*v.* Chap. X.).

THE EFFECT ON UTERINE POSITION OF DIGITAL PRESSURE IN THE VAGINAL FORNICES.

This is a subject of great practical importance.

If, when a patient is lying on her left side, the index finger of the examiner's right hand is passed into the vagina as far as the posterior fornix, and pressure made there in the direction of the antero posterior axis of the fornix, the following results may be noted :—

(1.) The posterior vaginal wall is elongated, the cervix drawn back, and the uterus, if anteverted, becomes more so (fig. 66).

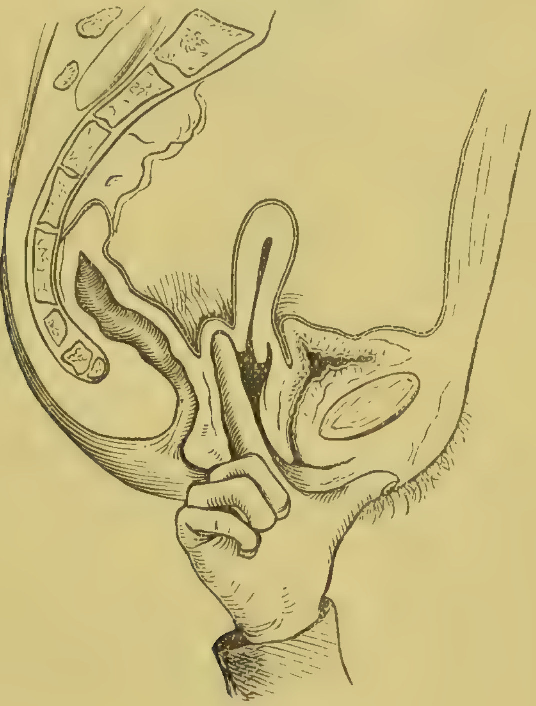


Fig 66.

Anteversion being produced by digital pressure in posterior fornix.

(2.) If the uterus is retroflexed, the flexion is not remedied. Should the fundus be fixed, the retroflexion is increased as the cervix is drawn back while the fundus remains.

Similarly, if pressure be made in the anterior fornix :—

(1.) The uterus becomes elevated and slightly rotated backwards, because the cervix is pulled forwards (fig. 67).

(2.) If the uterus is anteflexed, the flexion is not diminished.

By pressure in these fornices, therefore, we only act on the cervix, unless the uterus is very much retroverted or anteverted. The body of the uterus is acted on only indirectly, through its union with the cervix.

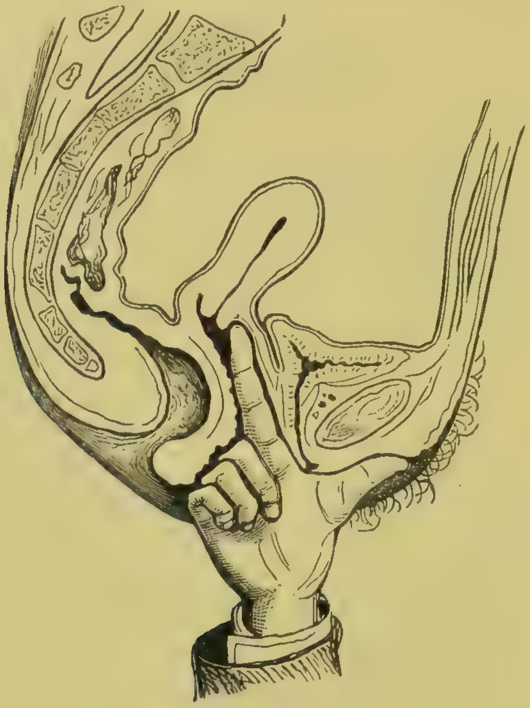


Fig. 67.

Retroversion of uterus produced by digital pressure in anterior fornix.

Consequently, no vaginal pessary can undo the flexion of a retroflexed or anteflexed uterus.

RELATION OF POSTURE TO EXAMINATION AND TREATMENT.

We have already mentioned several postures as being the proper ones for certain manipulations; and we here sum up briefly what it is of use to know in regard to these.

The *side-lateral*, where the patient lies on her side in the ordinary way, is convenient for vaginal examination; passage of Fergusson's, Neugebauer's, or Cusco's speculum; passage of the sound and catheter.

The *dorsal posture* is imperative for abdominal examination and the bimanual.

The *semiprone* is the best posture for passage of Sims' speculum; vesico-vaginal fistula operation.

The *lithotomy posture* is specially valuable for operations on the perineum, vaginal walls, cervix and uterus.

The *genupectoral posture* is useful for replacement of the retroverted uterus.

CHAPTER VI.

MENSTRUATION AND OVULATION.

LITERATURE.

Beigel—Die Krankheiten des weiblichen Geschlechtes: F. Enke, Stuttgart, 1875. *Dalton*—Report on the Corpus Luteum: Am. Gyn. Tr., Vol. II., p. 11: Physiology, 6th edition, J. and A. Churchill, 1876. *Engelmann*—The Mucous Membrane of the Uterus, with especial reference to the Development and Structure of the Decidua: Am. J. of Obst., Vol. VIII., p. 30. *Frey's* Histology—Barker's Tr., 1874. *Kinkead*—Med. Press, September 14, 1881. *Kundrat*—Untersuchungen über die Uterusschleimhaut: Strickers Jahrbuch, 1873. (Kundrat and Engelmann were co-workers.) *Leopold*—Studien über die Uterusschleimhaut während Menstruation, Schwangerschaft und Wochenbett: Archiv. für Gynäk., Bd. XI., S. 1091. *Loewenhardt*—Die Berechnung und die Dauer der Schwangerschaft: Archiv. für Gynäk., Bd. III., S. 456. *Möricke*—Die Uterusschleimhaut in den verschiedenen Altersperioden und zur Zeit der Menstruation: Ztschr. für Geburtshülfe und Gynäk., VII. Band, 1 Heft, 1881. *Underhill*—Note on the Uterine Mucous Membrane of a Woman who died immediately after Menstruation: Ed. Med. J., 1875. *Simpson, A. Russell*—Emmenologia; Contribution to Obstetrics and Gynecology: Edinburgh, A. and C. Black. *Lawson Tait*—Br. Med. Journ., June 4, 1881. *Williams*—On the Structure of the Mucous Membrane of the Uterus, and its Periodical Changes: London Obst. Jour., Vol. II., p. 681.

THE subject of Menstruation is not as yet well known, and on many points eminent and trustworthy observers are at variance. So far as our present knowledge goes, the following is a brief *resumé*.

PRELIMINARY CONSIDERATIONS.

Definition.—A periodical flow of blood from the uterine cavity, with shedding of the superficial layers of its mucous membrane, accompanying the discharge of an ovum from the ovary, occurring in properly developed women between the ages of 14 and 44, and interrupted by uterogestation and lactation.

Period of its Onset.—Menstruation begins, in this country, usually at the age of 13 to 15 (puberty). It may be delayed to 16, 17, or 20; but this is unusual. Its onset is earlier in warm countries, later in cold ones; earlier in delicately nurtured girls.

Period of its Cessation.—With the interruptions of pregnancy and lactation, it continues in healthy women until the age of 44 to 50. The period of its final cessation is known as the menopause. As a general rule the menopause is early when menstruation has begun early, and *vice versa.*

GENERAL PHENOMENA OF MENSTRUATION.

Changes at Puberty.—At this period of life, when the girl becomes the woman, we find certain well marked general changes occurring. The bust and mons veneris develope and the whole contour of the body becomes more rounded and attractive; hair appears on the genitals. The romping carriage of the girl becomes subdued, and greater shyness characterises her conduct to the opposite sex.

Phenomena premonitory to each menstrual flow.—There is usually a feeling of weight in the pelvis and increase of sexual inclination. Many women, however, have very little uneasiness during the whole flow; while others are always considerably distressed,—this distress being still outside the boundary of actual disease.

Periodicity and duration of Discharge.—When once established it recurs with great regularity every 28 days (in – 71 p. c.), 30 days (in – 14 p. c.), 21 days (in – 12 p. c.), or 27 days (in + 1 p. c.). We speak therefore of the 21 day *type* and so on. It lasts for a number of days, varying from 2 to 8. If below 2 or above 8 it is abnormal; but of course other points besides mere duration must be taken into account.

LOCAL PHENOMENA.

Three periods are distinguished;

1. Invasion,
2. Persistence,
3. Decline.

1. *Invasion.*—Discharge pale.

2. *Persistence.*—Discharge bright red, non-coagulable from its admixture with mucus. It consists microscopically of epithelium from vaginal, cervical, and uterine cavities; mucous globules; compound granular corpuscles, and red and white blood corpuscles.

3. *Decline.*—Discharge lessens in amount and becomes lighter in colour.

The total *quantity* varies from 2 to 8 ounces.

Thus far we have related facts fairly well ascertained and not much disputed. We now enter on more debateable ground, in considering—

I. Ovulation;

II. The Corpus luteum;

III. Source of discharge, and changes in the uterine mucous membrane.

I. *Ovulation.*—So far as our present knowledge goes, ovulation forms the starting point of the process of menstruation. We have already considered the structure and development of the ovary, and now describe

The changes in the Ovary at each Menstrual Period.—A graafian follicle enlarges and moves nearer the surface. Probably this produces through a nervous mechanism, a hyperæmia of the whole pelvic contents,—peritoneum, connective tissue, uterus, ovaries, Fallopian tubes, and vagina. It is alleged, as yet on insufficient grounds, that the fimbriated end of the Fallopian tube grasps the ovary and that the ovum from the ruptured graafian follicle passes into it and along the tube to the uterine cavity. Professor Kinkead of Galway has recently advanced another explanation. He points out that, between the fimbriated end of the Fallopian tube and the ovary, we have the ovarian fimbria (fig. 22) forming a groove which is converted into a tube by the surrounding viscera; and that consequently we have capillary action towards the uterus. This will lead the ovum into the Fallopian tube. However it may reach the Fallopian tube and uterus, its further development depends on its fertilization or non-fertilization. In the latter case it passes off unnoticed in the menstrual discharge; in the former it developes into the fœtus.

II. *The Corpus luteum.*—After the rupture of the graafian follicle, we get its cavity filled up by the structure known as the corpus luteum.

The corpus luteum consists of a vascular framework, with a yellow pigmentary and cellular substance. It varies according as pregnancy does or does not follow its formation. The difference is well given in Dalton's table, which we subjoin.

	CORPUS LUTEUM OF MENSTRUATION.	CORPUS LUTEUM OF PREGNANCY.
End of 3 weeks.	12 by 13 mm. in diameter; central clot reddish, convoluted wall pale.	
One month.	Smaller; convoluted wall bright yellow; clot still reddish.	Larger; convoluted wall bright yellow; clot still reddish.
Two months.	Insignificant cicatrix.	12 by 22 millimetres in diameter; convoluted wall bright yellow; clot perfectly decolorized.
Four months.	Absent or unnoticeable.	18 by 22 millimetres in diameter; clot pale and fibrinous; convoluted wall dull yellow.
Six months.	Absent.	Still as large as at the end of the second month; clot fibrinous; convoluted wall paler.
Nine months.	Absent.	10 by 13 millimetres in diameter; central clot converted into a radiating cicatrix; external wall tolerably thick and convoluted, but without any bright yellow colour.

III. *Source of Discharge and Changes in the Uterine Mucous Membrane.*—All observers are agreed that the mucous membrane of the uterine cavity is the source of the discharge, *i.e.*, that it comes from the area limited by the uterine ends of the Fallopian tube and the os internum.

Now begins the divergence.

(1.) Williams holds that "uterine contraction drives the blood from the muscular wall into the mucous membrane; the vessels of this membrane, having undergone fatty degeneration, give way, and extravasation of blood results. This extravasation takes place always near the surface, for in that situation the degenerative change has most advanced. The rush of blood into the vessels of the mucous membrane expels the contents of the glands, together with the greater part of their lining epithelium. . . . When hæmorrhage has taken place into the membrane, it undergoes rapid disintegration, and becomes entirely removed. . . ."

The new mucous membrane "is produced by proliferation of the elements of the muscular wall of the organ, the muscular fibres producing the fusiform cells, the connective tissue, the round cells, and the

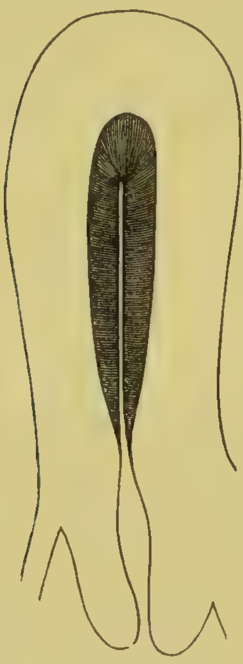


Fig. 68.

Diagram of Uterus just before menstruation. The shaded portion represents the mucous membrane (J. Williams).

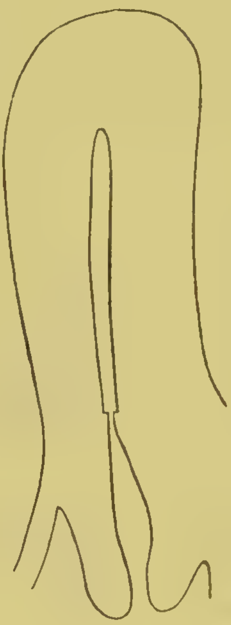


Fig. 69.

Diagram of Uterus when menstruation has just ceased, showing the cavity of the body deprived of mucous membrane (J. Williams).

groups of round cells in the meshes formed by the muscular bundles, the glandular epithelium."

Entire removal of the mucous membrane and its regeneration from the muscular coat, are the essentials of Williams' views.

(2.) Kundrat and Engelmann describe the change at the menstrual period as follows :—

Mucous membrane becomes swollen and pulpy, and measures in thickness 3—6 mm. The thickness is most marked at the fundus and central portions of the anterior and posterior surfaces. The surface is puffy and injected ; glands are distinctly seen on section as fine spirals.

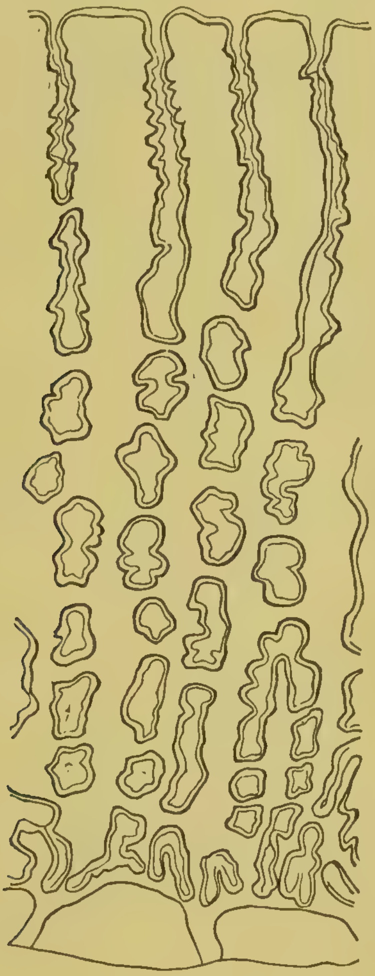


Fig. 70.

Mucous Membrane of menstruating uterus ($\frac{40}{1}$, Kundrat and Engelmann).

Microscopically, this increase in thickness is seen to be due to a proliferation of the round cells of the stroma, an enlargement of all the cell elements in the superficial layers, and an increase of the intercellular substance. This superficial layer has grown far above the original gland openings, causing the funnel-shaped depressions or small pits seen on surface view. The glands are increased in thickness and length. The vessels are enlarged and gorged with blood. Fig. 70 shows the mucous membrane of the menstruating uterus magnified 40 times; it should be compared with the mucous membrane of the non-menstruating uterus at fig. 19, also magnified 40 times.

The increase of the thickness of the mucous membrane begins as the time of menstruation approaches, is most marked during the period itself, and gradually decreases after the cessation of the catamenial flow.

Fatty degeneration takes place in the cells of the interglandular tissue, bloodvessels, and glandular and surface epithelium.

They hold that "the hæmorrhage is always confined to the surface of the lining membrane, and is due to the fattily degenerated tissue being unable to resist the blood pressure;" and *they therefore maintain, what is most probably the case, that only the superficial layer of the mucous membrane is shed at a menstrual period.*

(3.) Leopold denies the existence of any fatty degeneration of the superficial layers of the mucous membrane. He believes that an extravasation of red and white blood corpuscles from the superficial capillaries takes place especially towards the superficial layer, undermining the uppermost layer of cells; and that, finally, the copious supply of blood reaching these capillaries from the numerous arteries causes rupture and bleeding. The mucous membrane is regenerated by an upward growth of the glandular epithelium.

Williams, Kundrat, Engelmann, and Leopold examined uteri from *post-mortem* cases. Recently Möricke has curetted the uteri of living women at various stages of their menstruation, and microscopically examined what he removed. He asserts that "during menstruation the mucous membrane disappears neither partially nor fully." This shows how widely microscopists vary. Williams says all the mucous membrane is removed; Kundrat, Engelmann, and Leopold say only the superficial layers are removed; and Möricke says none is removed.

We have deemed it best to lay these views before the student. The subject is difficult to investigate, and one on which the authors are not qualified to give an opinion. They incline, however, to the views of Kundrat, Engelmann, and Leopold. The chief difficulty in regard to Williams' view is the regeneration of the new mucous membrane from the muscular coat.

Finally, it should be noted that almost all observers consider *ovula-*

tion and *menstruation* as occurring together. Beigel's view, that ovulation occurs at any time and that menstruation is a mere evidence of sexual excitement, has found no supporters.

A dispute still exists as to which ovum is fertilized when pregnancy occurs—the ovum of the bleeding period, or that of the first period missed. Many observers believe in Loewenhardt's theory, viz., that the ovum fertilized is that of the first period missed.

Lately the dominant influence of the ovary in menstruation has been questioned by some, notably by Lawson Tait. The operation known as Battey's operation, where both ovaries are removed, does not always cause a cessation of menstruation. Tait asserts that menstruation will always cease if the Fallopian tubes are also excised; and therefore believes that they play an important part in menstruation, hitherto unsuspected.

Leopold's monograph is illustrated by many valuable lithographs, and the same may be said in regard to Dalton's work on the Corpus Luteum.

SECTION II.

PHYSICAL EXAMINATION OF THE FEMALE PELVIC ORGANS.

IN this section we have to take up the physical examination of the female pelvic organs, that is exploration by the hands and instruments of the gynecologist. This will be considered in the following manner:

CHAPTER VII. Abdominal Examination: Vaginal Examination: the Bimanual Examination, with its various modifications.

CHAPTER VIII. Examination per Rectum.

CHAPTER IX. The Volsella.

CHAPTER X. Vaginal Specula.

CHAPTER XI. The Uterine Sound.

CHAPTER XII. Sponge Tents and other Uterine Dilators.

CHAPTER XIII. The Curette.

CHAPTER XIV. Knives, Scissors, Needles, Sutures, Antiseptics, Douches and Syringes, Anæsthetics.

CHAPTER VII.

ABDOMINAL EXAMINATION: VAGINAL EXAMINATION: THE BIMANUAL EXAMINATION WITH ITS VARIOUS MODIFICATIONS.

In a female patient whose symptoms point to a pelvic cause, it is necessary to investigate the case by what is commonly known as a vaginal examination. A mere vaginal examination, however, gives very little information. The proper method is first to make an external abdominal examination and then the vaginal examination, the latter being only a stage of the more complete method of investigation known as the bimanual. Special cautions as to cases unsuitable for pelvic exploration are given under the head of vaginal examination. We consider the examination in the following order:—

I. External abdominal examination.
II. Inspection of external genitals (only when necessary).
III. Vaginal examination.
IV. The bimanual or abdomino-vaginal examination.

EXTERNAL ABDOMINAL EXAMINATION.

The patient should lie on her back with her knees drawn up and her head supported on a pillow. The bowels and bladder should be empty. The abdominal surface should be bared and exposed from the epigastrum downwards; no part of the mons veneris should be uncovered. The most delicate method of accomplishing this is as follows. A sheet or blanket should be thrown over the recumbent patient; beneath this she should raise up her dress as far as the pit of the stomach; the examiner then places his one hand on the sheet, a little above the mons veneris, and turns it down over it with his other hand. The abdominal surface is examined in four ways, viz., inspection, palpation, percussion, auscultation.

A. *Inspection.*—The form, colour, equality or inequality of bulge of the abdominal surface should be noted; the presence or absence of the linea nigra, lineæ albicantes (fresh and old), pigmentary deposits, fat streaks, and skin eruptions. The linea nigra has no significance. The lineæ albicantes indicate that the patient's abdominal cavity is or has been distended beyond the normal. They are not specially significant of pregnancy. Fresh lineæ albicantes are glistening and pearly; old ones have a dull white or scarred appearance.

B. *Palpation* should be performed with both hands. For this purpose the hands, well warmed, are laid flat on the abdominal surface and the whole area manipulated between them. One hand alone is of no use. By this method the abdominal contents are compressed and driven between the hands. The feeling given normally is that of manipulating a plastic fluid. Tapping with one index finger so as to give a fluctuating impulse to the other hand is of great value. Circumscribed nodules or tumours, fluid collections, thickening of the skin, should be noted and mapped out on the scheme given in the chapter on case-taking.

For the more exact localisation of the normal and abnormal abdominal contents, anatomists divide the anterior abdominal surface into definite regions by vertical and transverse lines. The lower transverse line is drawn at the level of the anterior superior iliac spines; the upper one, between the most prominent parts of the ninth costal cartilages. A vertical line joining the cartilage of the eighth rib with the middle of Poupart's ligament on each side, completes the division into nine areas, which are named in order as follows (*vide* lithographic frontispiece).

Right Hypochondriac (5).	Epigastric (4).	Left Hypochondriac.
„ Lumbar (7).	Umbilical (6).	„ Lumbar.
„ Iliac (9).	Hypogastric (8).	„ Iliac.

In these regions the following structures are found:—

Epigastric region.—Right part of stomach; pancreas; liver.

Right Hypochondriac.—Right lobe of liver; gall bladder, part of duodenum; hepatic flexure of colon; part of right kidney, and its suprarenal capsule.

Left Hypochondriac.—Cardiac end of stomach; spleen and narrow extremity of the pancreas; the splenic flexure of the colon; the upper part of the left kidney, with the left suprarenal capsule; sometimes also a part of the left lobe of the liver.

Umbilical.—Part of the omentum and mesentery; the transverse part of the colon; lower part of the duodenum, with some convolutions of the jejunum and ileum.

Right Lumbar.—The ascending colon; lower half of the kidney; and part of the duodenum and jejunum.

Left Lumbar.—The descending colon; lower part of the left kidney, with part of the jejunum.

Hypogastric.—The convolutions of the ileum; the bladder in children, and, if distended, in adults also; the uterus when in the gravid state.

Right Iliac.—The cæcum, with the appendix vermiformis, and the termination of the ileum.

Left Iliac.—The sigmoid flexure of the colon. (*Quain.*)

Plate III. shows a valuable coronal section, published by Ruedinger; it should be carefully studied. The numbers refer to the following structures.

1. Right lung. 2. Right auricle; to its left is the larger coronary vein. 4. Right branch of pulmonary artery. The shorter left branch is seen at the left. 7. Liver. Note the impression on its under and right side from the right flexure of the colon. 8. Stomach. Note how its long axis is vertical and that the main bulk of the stomach is to the left of the middle line. 9. Ascending colon. 9*. Opening of small intestine. 10. Small piece of junction between stomach and duodenum. 11. Pancreas. 12. Duodenum. 13-13. Small intestine. 14. Fundus uteri. 15. Bladder, with ureteric openings. 16. Connective tissue. 17. Descending colon. 18. Sigmoid flexure. 19. Mesentery.

In palpating the normal abdomen, the sensation given is one of impulse communicated generally through a plastic fluid. When free fluid is in the abdominal cavity the impulse is more distinct. When the fluid is encysted, the impulse and tense feeling are localized.

When any large body is felt in the abdominal cavity, the first point to be determined is whether the body is pelvic or abdominal. This is easily done by attempting to press the hand downwards just above the symphysis pubis. If the tumour is pelvic and rising up into the abdomen, the hand cannot be so pressed; and conversely.

In all tumours, the existence or non-existence of intermittent contractions should be carefully noted. Their presence indicates a uterine tumour—pregnancy or soft fibroid.

The following general points should be kept in mind. The bladder is only in the hypogastric region when distended or displaced upwards: if empty it is behind the pubis, and in the true pelvis: a distended bladder may be as large as a six months' pregnancy. Ovarian tumours are more or less lateral; uterine tumours generally central, although the pregnant uterus has usually a right lateral obliquity. In advanced pregnancy, the parts of the fœtus can be distinctly palpated. Finally, it should be kept in mind that in all cases of cystic tumours the catheter should be passed into the bladder, for an obvious reason.

Case.—Mrs A. was sent for consultation as to removal of internal tumour. On examination, a cystic tumour was felt mesially in the abdomen and reaching up to umbilicus. Vaginal and Bimanual examination were exceedingly painful. A catheter passed into the bladder evacuated a large amount of urine. The uterus was now found to be retroverted and gravid 3½ months, and the cystic tumour had disappeared.

C. *Percussion* is to be performed in the usual way. To perform this thoroughly, the patient should be percussed (*a*) when on her back; (*b*) when on her left side; (*c*) when on her right side; (*d*) when sitting up. Changes in the percussion note on the patient changing her posture should be carefully noted as they are of great value (*vide* under Ovarian Tumours and Ascites).

D. *Auscultation* is of great value, and is performed with the ordinary stethoscope. The fœtal heart, uterine souffle and friction may be heard by it. The importance of auscultation is evident. Fœtal heart sounds indicate pregnancy; the point of greatest intensity of the heart sounds indicate the lie of the child. Uterine souffle and no heart sounds indicate either pregnancy and child dead, or fibroid tumour. Ovarian cysts have no souffle.

Before finishing abdominal examination, the patient should be made to raise her shoulders by grasping the examiner's hands. When there is no encysted abdominal tumour the recti can be seen to flatten the abdominal contour; if, however, a solid or cystic tumour be present the contour is unaltered. An exception should be made in the case of thin walled cysts with fluid of a low specific gravity, where the recti do flatten the contour as in the former case.

INSPECTION OF EXTERNAL GENITALS.

This should not be made a routine practice. As a general rule, inspection of the genitals should only be made when there is local tenderness, where syphilis or gonorrhæa is suspected, or where it is said by the patient that something comes down at the vaginal orifice. Soft chancres, hard chancres (almost never seen in females), mucous patches, condylomata; urethral caruncles; irritable spots causing vaginismus; labial abscess; parturition tears of perineum and labia; prolapsed pelvic organs; external or internal piles, may be found.

VAGINAL EXAMINATION.

Preliminaries.—Vaginal examination should not be made on girls below or little beyond the age of puberty, unless the symptoms are urgent, *e.g.*, mechanical retention of menstrual fluid from atresia. In the case of unmarried women it should not be performed unless specially necessary. In both classes of patients the value of a rectal examination should be kept in mind. The vaginal examination should be made on married women whose symptoms point to a pelvic cause. Finally, no woman should be examined vaginally when menstruating normally, unless under exceptional circumstances.

After settling these preliminaries and having obtained the patient's consent to "examine" (a term understood by all women as meaning a vaginal examination), the next point is to determine the position the woman is to occupy while the examination is going on.

In this country it is customary to place the woman on her left side for the vaginal examination, and to turn her on her back for the performance of the Bimanual. The patient, therefore, lies on a convenient couch with her knees well drawn up and her clothes loose. The examiner carefully oils or soaps the index and middle finger of his right hand. With his left hand he clears away the clothes from the hips so as to make a passage for the examining fingers, which he passes onwards till he reaches the cleft between the buttocks. He next passes them forwards over the anus, skin over base of perineum and fourchette, until the pulp of the finger rests at the vaginal orifice. In multiparous women, the lax vaginal orifice is easily felt. When in doubt, the student should pass his fingers cautiously on until he touches the vestibule, which is always smooth. Passing his fingers back he will then reach the vaginal orifice at the base of the vestibule.

The student must be careful not to pass his finger into the rectum by mistake. He should remember that the vaginal axis passes backwards, the anal axis forwards; that no force is required to pass his finger into the vagina of a woman whose hymen has been ruptured, whereas some force is necessary to overcome the resistance of the sphincter ani in all women. The clitoris, lying at the apex of the vestibule, should never be touched digitally.

The two fingers being now at the vaginal orifice should be carried backwards into the vagina until its upper limits are felt. While doing so the student should note—

1. *State of vaginal orifice;* patulous or narrow, presence or absence of painful spots, presence or absence of spasm.

2. *Walls;* presence or absence of rugæ; moisture, heat, secretion, tumours attached to them; fistulæ; foreign bodies such as pessaries, glycerine plug, oakum plug; shape of walls, length of walls.

3. *Cervix;* direction, size, shape, and consistence. Note especially if thickened, expanded, and fixed; drawn to one or other side; or if mobile and not fixed; or if split and with cicatrices radiating from it to vaginal roof.

4. *Os;* size, shape, consistence of lips. Thus it may be a dimple as in nulliparæ; transverse as in parous women (figs. 13 and 14); or the cervix may be split on one or both sides and thus no *os externum* is present, but the cervical canal is more or less exposed (Plate VIII.). Bodies projecting through it should be noted. They may be polypi, fragments of abortion, cancerous masses, stem pessaries.

5. *Posterior fornix* is concave when felt from below. It has normally a feeling like that of the inside of the angle of the mouth. Note if any lump can be felt through it, projecting down from Douglas pouch, rendering the fornix convex. A body or a feeling of resistance in the posterior fornix may be—

(1.) Fæces;
(2.) Acute or chronic inflammatory deposit, cicatrization of utero-sacral ligaments;
(3.) Retroverted fundus uteri;
(4.) Blood effusion;
(5.) Fibroid attached to posterior wall of uterus;
(6.) Ovary inflamed or cystic;
(7.) Ascitic fluid;
(8.) Extrauterine fœtation or hydatid (rare).

6. *Anterior fornix.*—Note if there is any body felt through it. If so, it is most probably the fundus uteri, normal or enlarged from pregnancy or fibroid. There may be also inflammatory or blood effusion or a tender ovary, but these are rare here.

7. *Lateral fornices.*—Note cicatrices, prolapsed or cystic ovary, lateriflexed uterus, inflammatory or blood effusion in broad ligament, dilatation of Fallopian tubes, fibroids placed laterally.

The vaginal examination has now been completed. The student should keep in mind that he really learns very little from a vaginal examination, just as he can learn very little as to the size and relation of any object by touching it with the fingers on a but limited area. Vaginal examination is thus only the preliminary to the bimanual or abdomino-vaginal.

BIMANUAL OR ABDOMINO-VAGINAL EXAMINATION.

This method of examination is the all important one in gynecology and is the one which the student and practitioner will find most valuable, so that its practice should precede all other methods of internal investigation. As the practitioner's experience increases, he will find that he relies more upon this and becomes less dependent on other means of examination.

Method of performing Bimanual. Position of Patient.—The patient must now be made to lie on her back. The head and shoulders should be supported and the knees drawn up.

Arrangement of examiner's hands.—The *internal* hand (the right) is placed as follows:—two fingers (index and middle) are in the vagina, the thumb rests in the fold between a labium majus and the thigh, and the other fingers lie in the cleft of the nates, fig. 71. The whole hand is then rotated backwards so as to bring its long axis as nearly as possible into the axis of the brim, and is then pushed up towards the brim of the pelvis. Thus the pubic segment, uterus with annexa, and posterior vaginal wall are lifted up towards the brim. The middle finger is placed over the os and the index one in the anterior fornix, so that the uterus as it is pushed up becomes more anteverted. The right

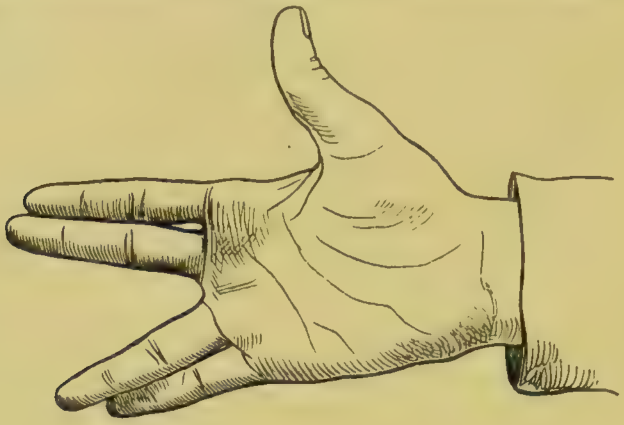


Fig. 71.

Right hand as in bimanual examination.

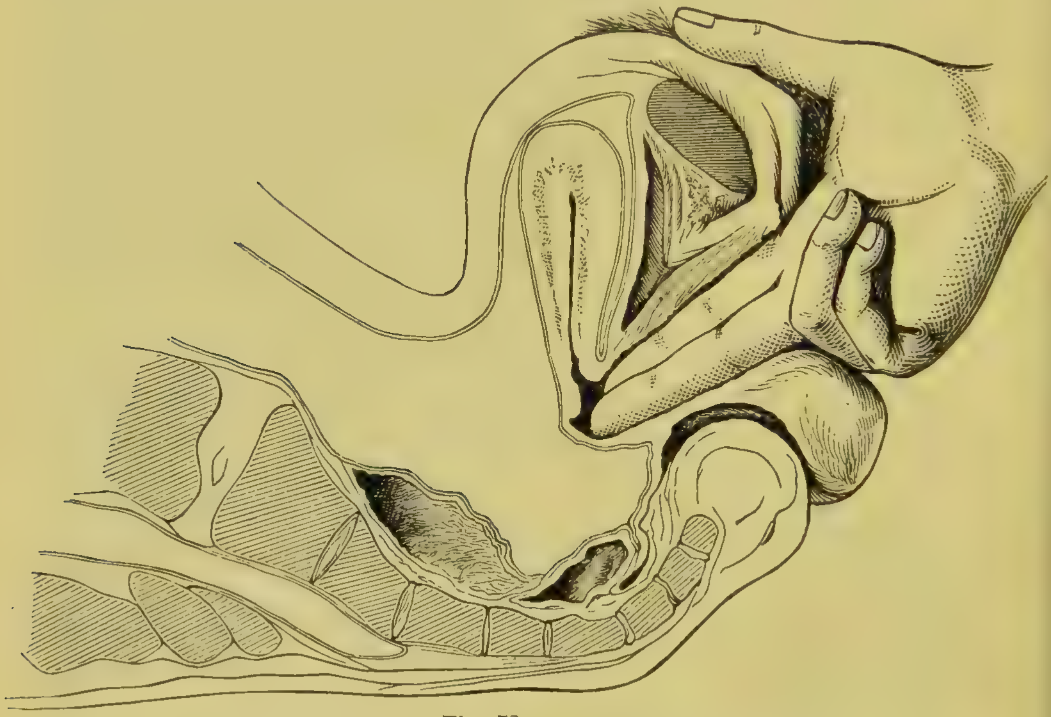


Fig. 72.

Bimanual Examination. The upper hand is not shewn (Hart).

hand while examining, therefore, has the appearance at fig. 71. The little and ring fingers may be doubled up as in fig. 72. The external hand (the left) is placed on the abdominal wall just above the pubis, with its long axis running obliquely between the iliac crests, its ulnar edge near the promontory and much deeper than the radial one. It is now steadily depressed until the abdominal wall below it is markedly cupped (figs. 72 and 73) and moulded over the uterus, ovaries, &c., which have been elevated by the inner hand. In this way the two hands estimate the size and relations of the pelvic contents, just as one would estimate the size of a watch covered with a cloth. The student should note specially that the upper hand should be steadily and not spasmodically depressed; that he should always keep the ulnar edge of this hand deeper, that is, nearer the sacrum, so that he may not retrovert the uterus; and that he should palpate all the abdominal areæ along the pelvic brim so as not to miss anything. *His first object in the bimanual examination is to determine where the uterus is*, as this

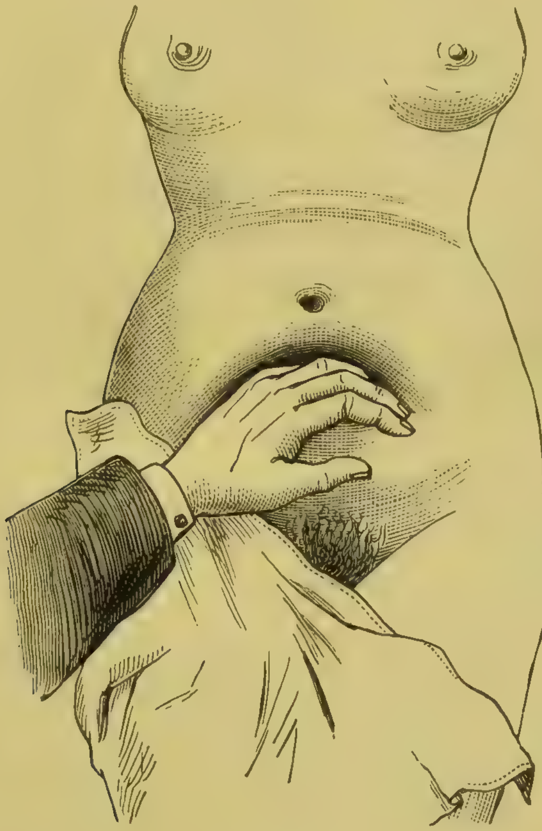


Fig. 73.

Anterior Abdominal Surface of Female, with upper hand placed for Bimanual (*ad naturam*).

greatly simplifies the recognition of abnormal products in the pelvis. He then bimanually explores the fornices, moving the internal fingers appropriately and noting what he feels. At first his diagnosis should be simply bimanual, *e.g.*, "uterus felt to front and a large firm lump behind it;" or, "uterus felt retroverted and a small moveable tumour on its left side."

It is of importance that the student should know what a "normal bimanual" is. The following is a description of the condition found in a nulliparous married woman, on vaginal and bimanual examination.

"Ostium vaginæ patulous, and admits two fingers; vaginal walls moist, rugous, with no abnormalities. Vaginal portion of cervix normal in size (fig. 13); os uteri felt like a dimple, looking downwards and backwards. No bodies are felt through the lateral and posterior fornices, which are concave on their vaginal aspects and have the feeling, on pressure, of the angle of one's mouth. In the anterior fornix a body is felt, which on bimanual examination is discovered to be the uterus lying to the front and not enlarged. The fundus and cervix meet at a very large angle. Bimanual exploration of the fornices reveals nothing distinctly palpable.* The patient complains of no pain during the whole examination, and has no symptoms referable to the pelvis."

Cases where the Bimanual is difficult.—The student will soon find that the bimanual can be performed in certain cases with great facility and accuracy, while in other women it is exceedingly unsatisfactory.

The best case for a bimanual is a woman a fortnight or three weeks after delivery. The reasons for this are evident. A puerperal woman has had the ostium vaginæ and vaginal walls relaxed by the child's head; the pubic segment has been drawn up and its attachments slackened; the abdominal walls have had their elasticity diminished by the full time uterus, and the uterus itself is not involuted to its normal size. In such a case there are evidently all the requisites for a good bimanual.

Difficult bimanual cases are found in stout nulliparous women, and in cases of pelvic inflammation. In such, the rectal examination, with or without the use of the volsella, is indicated.

Students at first find their bimanual unsatisfactory. By perseverance, however, they will obtain by means of it an accuracy in diagnosis which is astonishing. It is not only the best means of investigation, but one from which no possible harm can arise. In no cases is it contra-indicated except those of advanced cancer or of acute inflammation.

---

* One practised in the bimanual can feel the normal ovaries.

We have described the simple abdomino-vaginal examination. It will be readily understood that we may have others, as follows:

(1.) Recto-abdominal (finger in rectum and left hand above);
(2.) Recto-vagino-abdominal (middle finger in rectum, index finger in vagina, and left hand above);
(3.) Vesico-vagino-abdominal (middle finger in vagina, index in bladder, and hand above).

Of these the third is very rarely practised.

Note that in the Bimanual the pubic segment with uterus and its annexa are elevated, the sacral segment shortened, and the abdominal walls depressed (fig. 74).

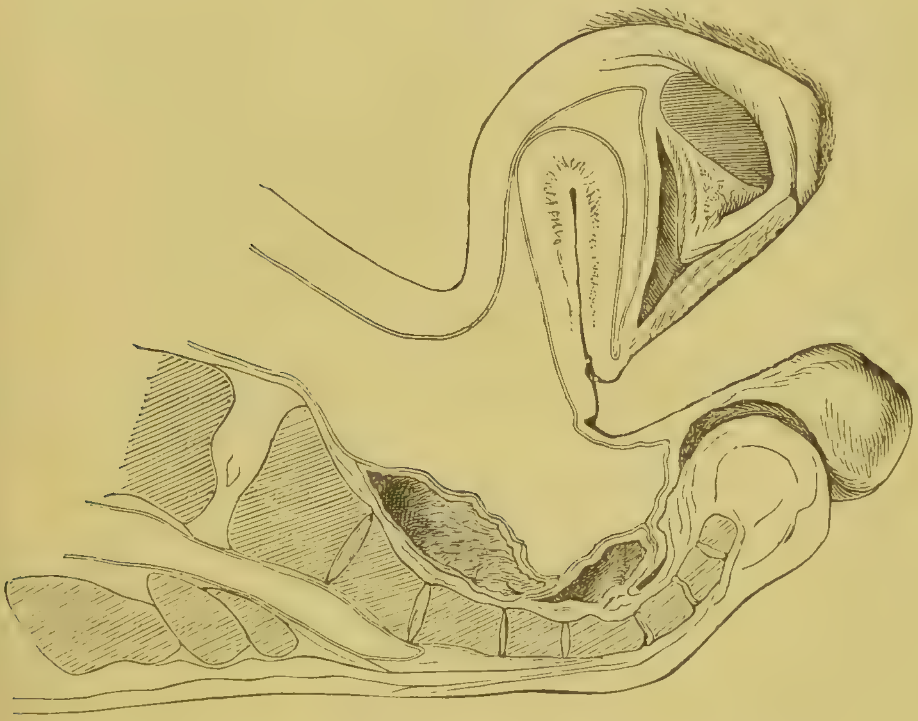


Fig. 74.

Displacement of pelvic floor segments and abdominal wall in Bimanual (Hart).

After the bimanual or other examination is finished, the examiner should scrupulously cleanse his hands. There are no better nor cheaper substances for this than turpentine and ordinary soap, as Dr Foulis of Edinburgh has shown. The odour is by no means disagreeable, and if found objectionable can be easily covered by vinegar which in itself is a good cleanser. In examining cancerous cases, where the odour is exceedingly penetrating and persistent, it is a good plan to dip the fingers in turpentine prior to the examination.

CHAPTER VIII.

EXAMINATION PER RECTUM.

LITERATURE.

Hegar.—Die operative Gynäkologie, zweite Auflage: Stuttgart, 1881: *Mundé*—Minor Gynecology: Wood & Co., New York, 1881. Consult Hegar for additional references.

THE results obtained by a vaginal examination are limited by the fact that the reflection of the vaginal walls to form the fornices, prevents the finger being pushed up to a sufficient distance. This defect is compensated for by the downward pressure of the upper hand in the Bimanual; but in those other cases where the abdominal walls are unyielding and the pubic segment stiff, due pelvic exploration by an abdomino-vaginal examination alone is impossible. In such cases, rectal exploration and the abdomino-rectal or abdomino-recto-vaginal examination are invaluable. They give better information than the more commonly practised abdomino-vaginal.

The usual methods are—

(1.) Simple rectal: abdomino-rectal: abdomino-recto-vaginal.
(2.) Passage of the *whole* hand into the rectum (Simon's method).

SIMPLE RECTAL: ABDOMINO-RECTAL: ABDOMINO-RECTO-VAGINAL.

Preliminaries.—The patient should be told that it is necessary to examine the bowel. If the rectum is loaded the examination should be deferred till next day, and the patient instructed to use a purgative at night and an enema in the morning.

The following points should be especially noted:—The examiner should thoroughly soap the fingers and nails. A vaginal examination may be made first; and then, the index finger being kept in the vagina, the middle one is passed into the rectum (fig. 75). If the patient is virginal and it is wished to avoid a vaginal examination, then the index finger alone is passed into the rectum. When the finger or fingers are withdrawn from the rectum the hands should be at once cleansed; there can be nothing more hurtful to a patient's feelings than the passing of the uncleansed fingers from the rectum into the vagina. The patient lies first on her left side and then on her back.

The finger passed into the rectum goes forwards; when passed into the vagina, the direction is backwards. After overcoming the resistance of the strong external sphincter it enters the rectal ampulla (fig. 36), which is often expanded by flatus. Passing the finger onwards and to the left side, a confused mass of tissue is felt in which we may detect the opening betwixt the segments of the sphincter tertius.

As we pass the finger inwards we note piles (internal and external), fissures, polypi, ulcers, stricture (specific and malignant).

We next turn the pulp of the examining finger so that it lies on the anterior rectal wall. Through this can be felt the cervix. Note that the whole cervix is felt, which is much larger than the vaginal portion felt on vaginal examination. Be sure not to mistake it for the body of the uterus. If the uterus lies to the front its forward direction can be noted; if to the back, then the body will be felt on passing the finger further up. Pushing the finger well upwards and passing it first to the right and then to the left, we feel the ovaries (more distinctly when enlarged) as small oval tender bodies (fig. 75).

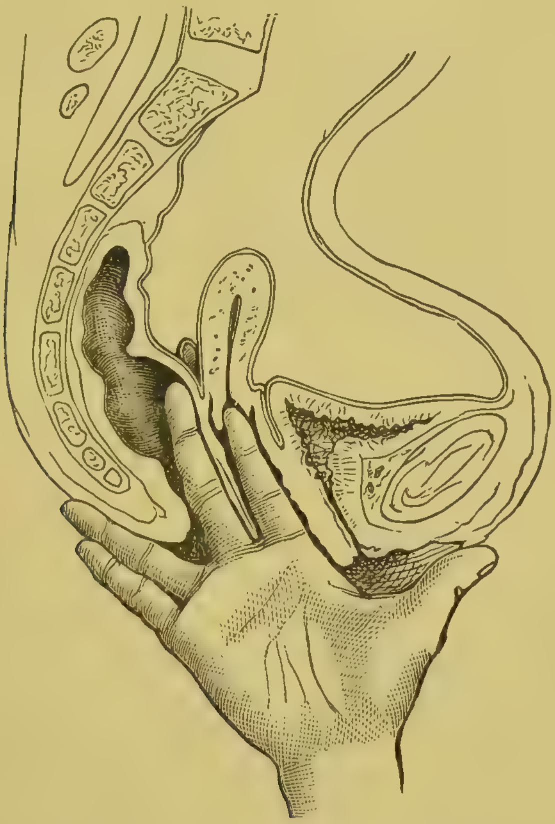


Fig. 75.

Abdomino-recto-vaginal Examination. Upper hand not shewn. Note prolapsed ovary.

Fig. 40 shows a common condition of the uterus which is constantly mistaken for and treated as a retroversion. We allude to the uterus anteflexed and drawn back by pelvic cellulitis of the utero-sacral ligaments. As the patients are usually sterile and have therefore somewhat unyielding abdominal walls which cause a difficult bimanual, and as a lump is felt in the posterior fornix, the diagnosis of retroversion is often made. The rectal examination, however, clears up the case, as the finger feels the knee of the flexion and the fundus going forward from it.

The *upper hand* is used during the rectal examination just as in the bimanual, *i.e.*, the examination is abdomino-recto-vaginal or abdomino-rectal. The simple rectal (with the finger in the rectum unaided by the other hand) does not give much information as to the condition of the uterus.

Where, from rigidity of the abdominal walls, it is difficult to press down or fix the uterus with the external hand, this may be done with the volsella in the vagina. The use of the volsella enables us to draw the uterus better within reach of the finger in the rectum. This examination per rectum aided by the volsella will be considered in the next chapter.

Of all manual examinations of the pelvis, the abdomino-rectal or abdomino-vagino-rectal is the most thorough. In retroversions, prolapsed ovaries, and pathological anteflexion, it should never be omitted. A patient may object to it and refuse to allow it; and, of course, the practitioner must keep this in mind.

SIMON'S METHOD OF PASSING THE HAND INTO THE RECTUM.

This consists in passing the whole hand through the sphincter ani into the rectum, and even up to the transverse colon. The patient is deeply narcotised; the hand is passed cautiously through by inserting first two fingers and the others successively until the entire hand is passed; incision of the sphincter ani may be necessary. Sometimes an incurable incontinence of fæces has resulted.

The unanimous opinion of gynecologists is that this severe method of examination is unnecessary. Careful bimanual examination, aided when necessary by anæsthetics, gives equally good results.

For specialists it is of use to know that valuable results in minute precise rectal examination can be got by first injecting air into the rectum. The whole rectum up to the sigmoid flexure can be dilated, the sphincters made out and the bony pelvic wall carefully explored. It is necessary to add, however, that this is an adjunct to the rectal method of examination of use only in certain instances.

CHAPTER IX.

THE VOLSELLA.

LITERATURE.

Goodell—Some Practical Hints for the Treatment and the Prevention of the Diseases of Women: Medical and Surgical Reporter, January 1874. *Hegar*—Zur gynäkologischen Diagnostik: Die combinirte Untersuchung, Volkmanns Sammlung, No. 105. *Simpson, A. Russell*—The Use of the Volsella in Gynecology: Contributions to Obstetrics and Gynecology, p. 183.

We have already seen that one of the most striking anatomical features and properties of the uterus is the considerable range of its mobility in almost every direction. It can be pushed upwards from its normal position $1\frac{1}{2}$ or 2 inches, and is displaceable forwards or laterally in a very marked degree. If laid hold of with the instrument known as a volsella, it can be drawn downwards (by a force not exceeding five or six pounds) until the os externum lies close to the vaginal orifice. This procedure facilitates, in suitable cases, diagnosis and treatment of gynecology so much that it is well worthy of the allotment of a special chapter to its discussion. We take up—

1. Description of instrument;
2. Method of use;
3. Mechanism of the displacement it causes;
4. Uses;
5. Contra-indications.

1. *Description of Volsella.*—At fig. 76 is seen the useful volsella employed by Russell Simpson. As it is generally the anterior lip of the cervix that is laid hold of, the slight pelvic curve given to the blades is unnecessary since the volsella lies along the straight anterior vaginal wall. Fig. 77 shows Hart's volsella, where this straightness of the blades *quâ* the vagina is secured, and the handle and fingers of the gynecologist are kept away from the vaginal orifice by the bend on the handle. Every volsella should have a catch on it. Sometimes it is useful to have an instrument whose blades pass over one another, so as to separate for instance the lips of a split cervix: such is Hank's instrument.

2. *Method of Use.* (*a*). *Without previous passage of Speculum.*—The

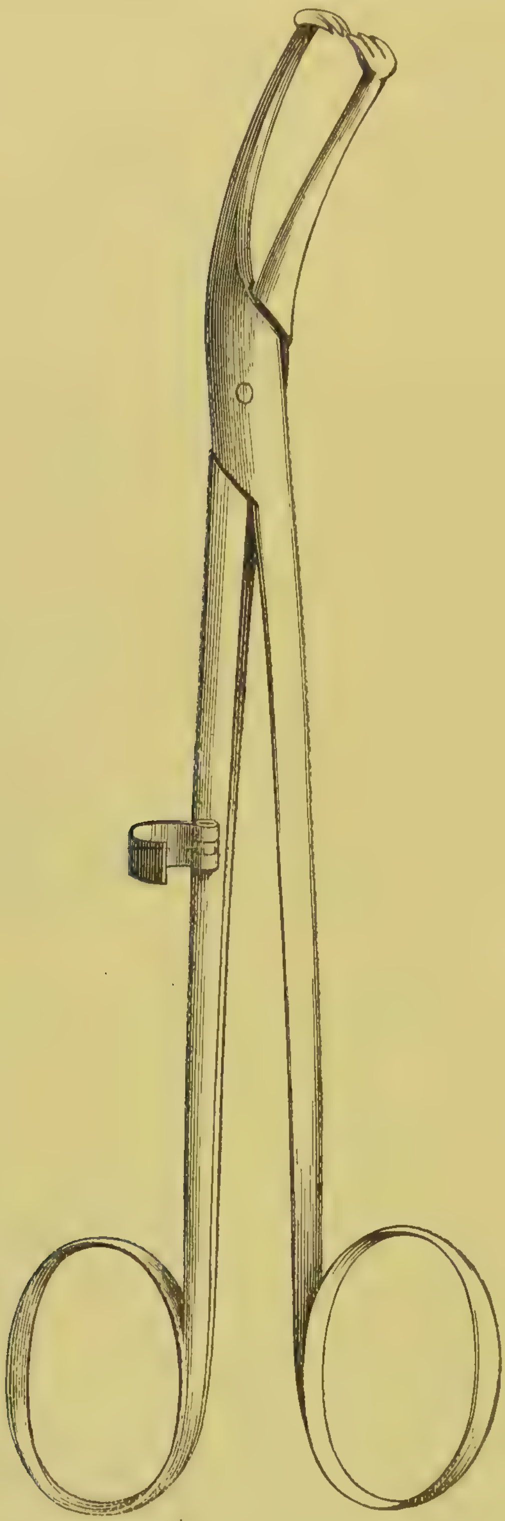


Fig. 76.

Professor A. R. Simpson's Volsella with catch.

patient is placed in the ordinary left lateral posture. Two fingers of the right hand are passed into the vagina and the anterior lip of the

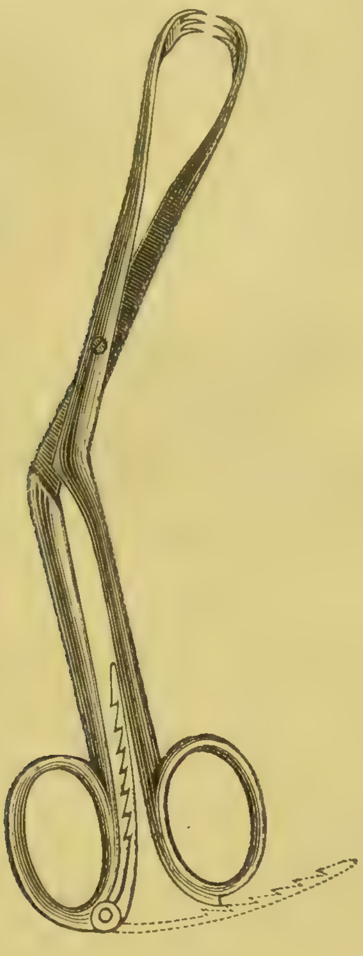


Fig. 77.

Dr Hart's Volsella.

cervix touched. The volsella, held in the left hand, is guided along between the index and middle exploring fingers; the anterior lip of the cervix is seized and drawn down. Rectal examination is now made.
(*b.*) *With the Speculum.*—For this, see Chapter X.

3. *Mechanism of displacement it causes.*—The uterus is drawn down so as to lie behind the symphysis pubis. If drawn down fully, as it may be in exceptional cases, it has its long axis in the vagina and the os externum near the vaginal orifice.

The vaginal walls are inverted, *i.e.*, when the os externum is at the vaginal orifice we have a deep pouch behind and in front of the uterus.
The relations of the bladder and rectum are given in fig. 78.

4. *Uses.* (*a*) *In diagnosis.*—(1.) The cervix which may seem "ulcerated," as it is commonly called, is easily demonstrated by the volsella, to be singly or doubly lacerated. For this purpose the anterior and posterior lips are laid hold of, and when brought together the ulceration is seen to be due to laceration with eversion.

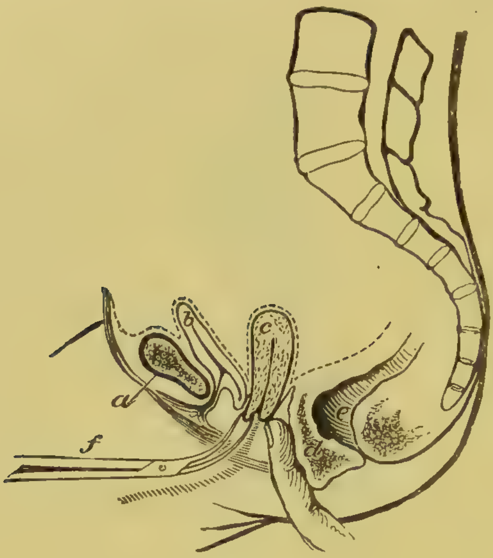


Fig. 78.

Mechanism of Displacement of Pelvic Floor Segments when Volsella is used (A. R. Simpson).
a Symphysis Pubis; *b* Bladder; *c* Uterus; *d* Perineum; *e* Rectum; *f* Volsella.

(2.) Abdominal tumours can be shown to be connected with the uterus or not as the case may be. If the patient be placed in the dorsal posture and the tumour be laid hold of by an assistant, then when the uterus is drawn down, the tumour can be felt to descend if fixed to it.

(3.) To the examination *per rectum* the volsella is a valuable addition. If one finger be placed in the rectum, and the cervix laid hold of with a volsella and drawn down, the mobility of the uterus can be estimated; if it be anteflexed by cicatrized utero-sacral ligaments, these can be felt tense (fig. 40); the whole posterior uterine surface may be palpated for small fibroids. The ovaries are made more accessible; and the uterus, especially if small, can have its length estimated by the rectal finger.

This method of examination of the uterus by rectum and volsella, judiciously conducted, is of the very greatest value.

It is evident that it will also help one as to the diagnosis of displacements of the uterus; but its value in this respect is somewhat lessened by the displacement its use causes. Thus it makes a retroversion less retroverted; an anteflexion less anteflexed; an anteversion less anteverted.

(*b*) *In treatment.*—In this the volsella is one of the most useful instruments the gynecologist possesses. Thus it helps greatly in the examination of the aborting uterus; in replacement of the gravid or non-gravid retroverted uterus; in insertion of sponge and tangle tents, or stem pessaries. In operations such as Emmet's for repair of the cervix, Sims' division of the cervix, amputation of vaginal portion of cervix, excision of the uterus through the vagina for cancer, it is indispensable.

Details on its uses in these cases will be given under the special descriptions of the operations; and it will also be shown in the chapter on specula, that by using the volsella the speculum may be dispensed with in certain cases.

5. *Contra-indications.*—It should not be used in acute peritonitic or cellulitic attacks, in distended Fallopian tubes, in hæmatocele or in advanced cancerous disease. No pain should be caused by its use provided that only the vaginal aspect of the cervix is laid hold of.

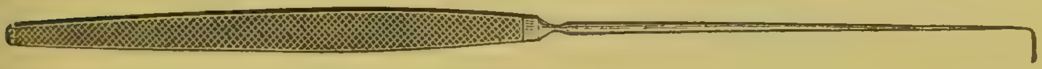


Fig. 79.
Sims' Tenaculum.

The amount of traction to be made will vary with the necessities of the case. In many instances only a mere steadying action is requisite; in others the cervix has to be drawn half-way down the vagina. In special cases the cervix is drawn down to the vaginal orifice or beyond it, as in amputation of the cervix or excision of the uterus. For simply steadying the cervix, Sims' tenaculum is of service (fig. 79).

CHAPTER X.

VAGINAL SPECULA.

LITERATURE.

Barnes—Op. cit. *Goodell*—Op. cit. *Hart*—Structural Anatomy, op. cit. *Mundé*—Op. cit. *Sims, J. Marion*—Clinical Notes on Uterine Surgery: Hardwicke & Co., London, 1866. *Thomas*—Op. cit.

We have already seen that the segments of the pelvic floor are separable when a woman assumes certain postures; that the sacral segment can be hooked up, and that by this means we get a view of the vaginal boundaries of these segments and of the os uteri. This is the natural method of opening up the pelvic floor; or the natural specular method.

Gynecologists had used various instruments for enabling them to look into the vagina: but all of these proved unsatisfactory until Marion Sims, noting the natural postural dilatation of the vagina, introduced his famous duckbill speculum.

We take up the consideration of four typical specula, viz.:—

1. The duckbill or Sims speculum,
2. The tubular or Fergusson speculum,
3. The Neugebauer and its modifications,
4. The bivalve of Cusco.

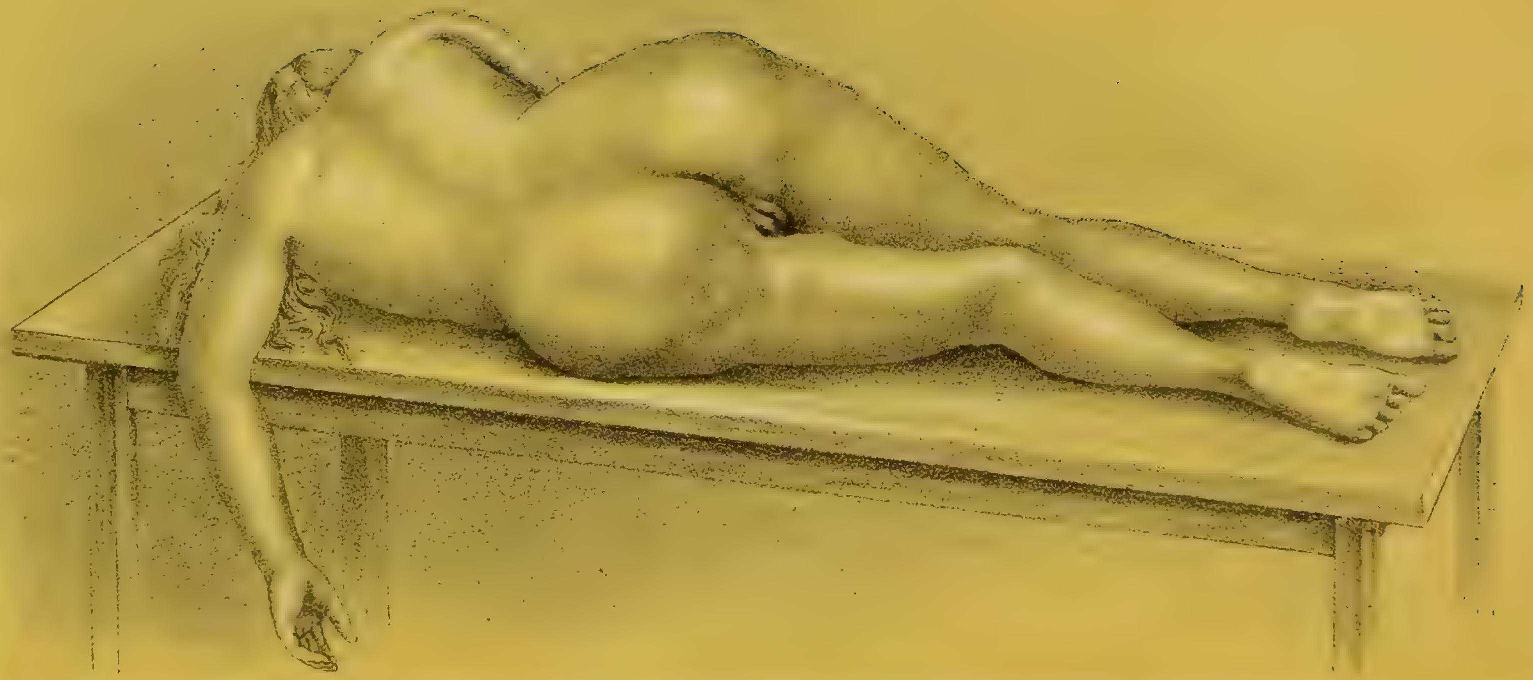
We note under each its nature, the method of employing it, and the theory of its action and uses.

1. The Sims or duckbill speculum is shewn at figs. 80, 81, and Plate V.

Its nature.—Each instrument in reality consists of *two specula*, which are of different size and connected by a handle; usually however we speak of these specula as the *blades* of the *speculum.* The real Sims' speculum is light, has each blade slightly concave on its anterior aspect, and has the blades at *right* angles to the intermediate handle.

Modifications of Sims' speculum are numerous. Indeed, it seems difficult for gynecologists to resist modifying an instrument, and rare to find them improving it. The most widely known modification is Bozeman's; it is heavier than Sims', has the blades meeting the

PLATE IV



W. & A. K. Johnston, Edinburgh & London

PLATE IV — FEMALE CADAVER IN SEMI-PRONE POSTURE (DRAWN FROM NATURE).

handle at an acute angle, and the blades more concave on the anterior aspect. (Figs. 81 and 82.)

One curious fact about almost all specula is, that they are too long.

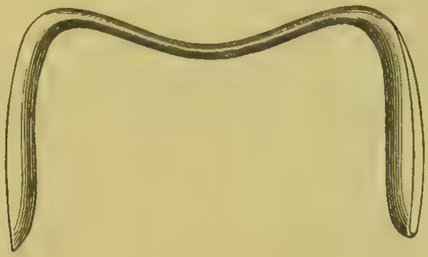


Fig. 80.

Sims' Speculum.

Sims' blade is 4 inches long, though the posterior vaginal wall measures only 3½ inches. Thus, as we wish to expose only the anterior vaginal wall and cervix uteri, a 3-inch length of blade is sufficient.

A modification of Sims' speculum, by Dr. Battey of Georgia, is worthy of note. It has one short blade which meets the handle at a more acute angle. (Fig. 83.)

25

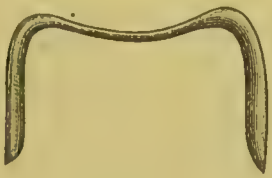


Fig. 81.

Sims' Speculum.

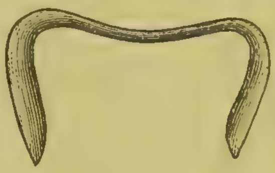


Fig. 82.

Sims' Speculum modified by Bozeman.

The method of employing Sims' speculum.—Under this it is important to note; (*a*) How to place the patient, (*b*) How to pass the speculum, and (*c*) How to hold it when passed.

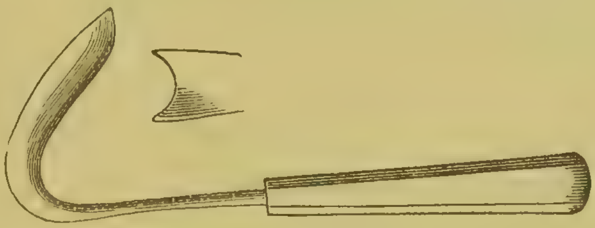


Fig. 83.

Battey's Speculum.

(*a*). *How to place the patient.*—The patient must be placed in the Sims' or semiprone posture. This is briefly as follows. The patient lies almost on the breast: *the lower left arm is over the edge of the* *couch* next the gynecologist: the hips are close to the edge: the knees are well drawn up; and *the upper or right knee touches the couch with its inner aspect.* The posterior aspect of the sacrum is therefore oblique to the horizon. (Plate IV.)

As the result of this posture—a modified genupectoral one—the vaginal walls separate when air is admitted; the pubic segment passing down with the viscera, the sacral one remaining behind.

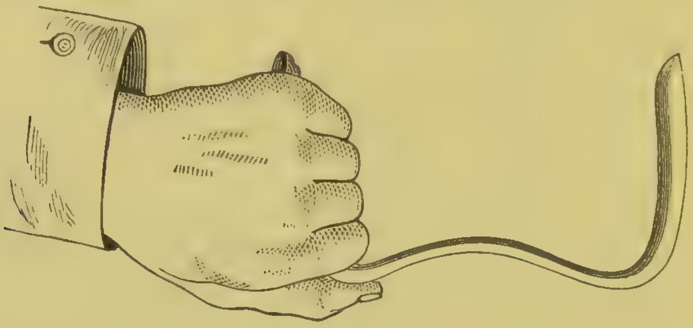


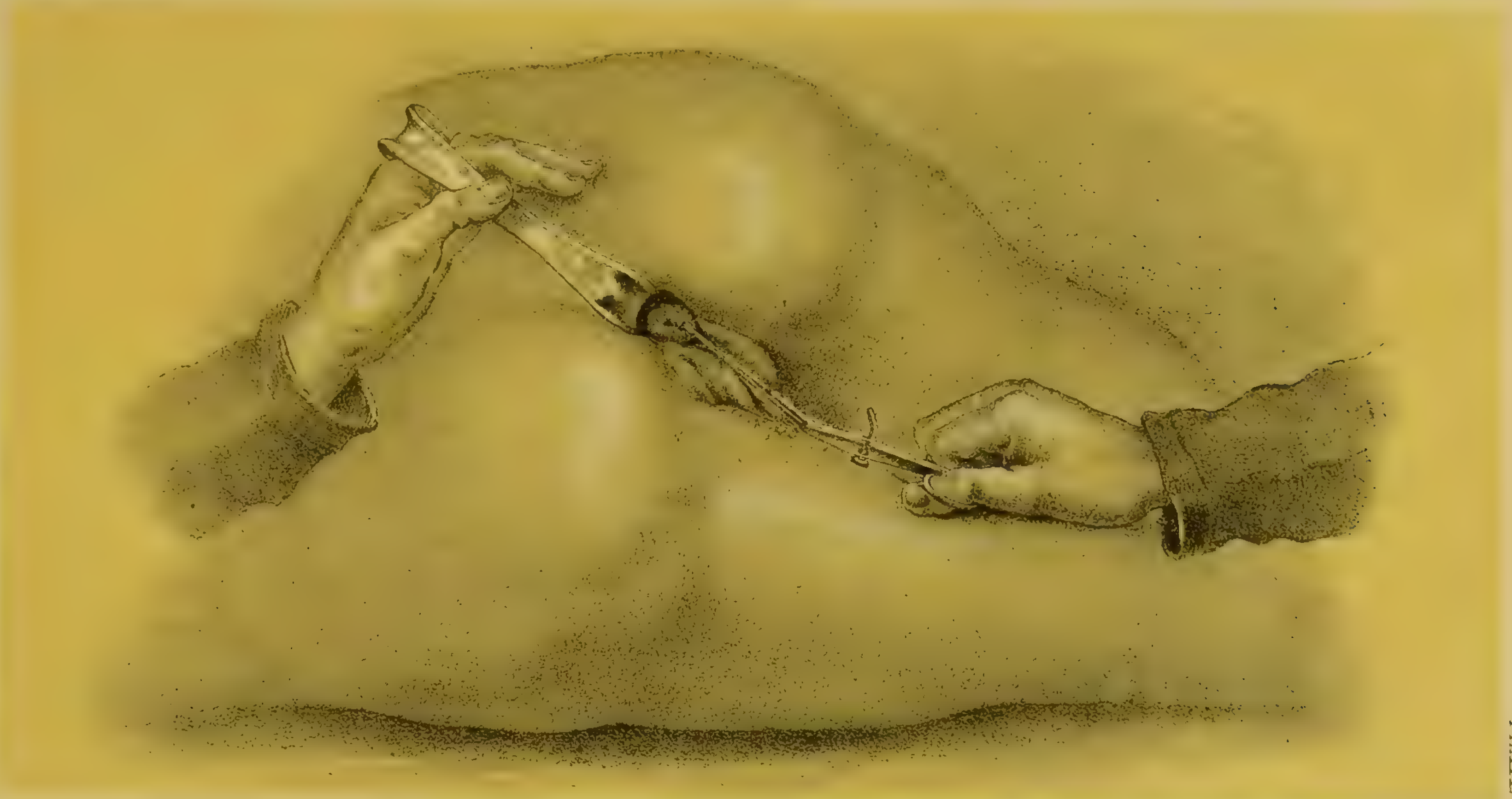
Fig. 84.

One method of holding Sims' Speculum.

(*b*). *How to pass the speculum.*—Choose the blade which is of the proper size to pass the vaginal orifice; warm it, and oil it with the fingers on its convex aspect only. The concave surface must be dry to reflect light, and therefore the speculum should never be oiled by dipping it. Hold it by the other blade in the left hand, as shewn at fig. 84. Then pass the index and middle fingers of the right hand into the vagina to separate the labia; carry in the speculum between them; push it onwards, following the curve of the posterior vaginal wall, until the beak of the instrument lies on the posterior fornix. Now draw the instrument back as a whole, in a direction at right angles to the posterior vaginal wall; then turn the beak forwards, so as to bring the cervix more into view. Finally tilt the blade, so that the beak lies on a lower level than the proximal end of the blade: this keeps up the upper labium.

(*c*). *How to hold the speculum when passed.*—Plate V. shews the speculum passed, and a convenient way of holding it. When passed, the cervix may be drawn down with a volsella (also shewn in Plate V). Various attempts have been made to add to the Sims speculum a means of rendering it self-sustaining; the majority of these are by no means successful, and therefore we need not describe what is seldom used. The knowledge of a simple method of effecting this in Battey's speculum is of use. This has a piece of indiarubber, with a hook at the end

PLATE V



W. & A.K. Johnston, Edinburgh & London

PLATE V.—FEMALE CADAVER IN SEMI-PRONE POSTURE, WITH SIMS' SPECULUM PASSED, AND UTERUS DRAWN DOWN WITH A VOLSELLA.

attached to the handle, which can be fastened in the pillow, sheet, or patient's dress: the cervix is drawn down with a volsella held in the one hand, leaving the other free for minor manipulation.

Theory of action and uses of the Sims Speculum.—The Sims speculum is based on the effects consequent on the genupectoral posture. When the patient is semiprone and the vaginal orifice opened, the segments of the pelvic floor separate; and then the Sims speculum is a simple means of hooking the sacral segment well back.

The Sims speculum is, on the whole, by far the most useful speculum. It is difficult to manipulate at first, but amply repays practice. Its discovery has been one of the greatest strides in gynecology. In vaginal and cervical operative surgery, it is the only speculum that can be used.

2. The FERGUSSON SPECULUM is seen at fig. 85. It is made in three

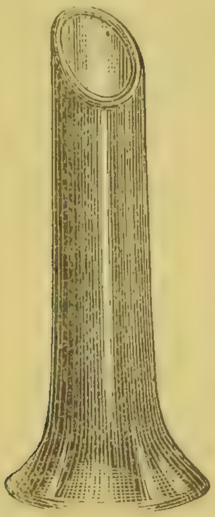


Fig. 85.

Fergusson Speculum.

suitable sizes; and may be described as a glass tube, with a proximal trumpet and a distal bevelled end. It is made of glass silvered internally and coated on the outside with caoutchouc. The bevelling of the distal end makes a shorter anterior side and a longer posterior one. The maker's name is usually placed at the trumpet end just at the foot of the anterior side, and serves to indicate that side when the speculum is in the vagina.

Mode of employment of the Fergusson Speculum.—The patient lies in the left lateral position with hips raised. Warm the speculum, and oil it on the outside. Take it by the trumpet end with the right hand and pass it into the vaginal orifice previously opened up by index and middle fingers of the left; now push it in, short side to the front, until arrested. By looking along it, the practitioner can note if the cervix is in view. It is generally not so, but may be snared by the following manœuvres; carry the trumpet end well back towards the perineum and then depress the distal end first to the left and then to the right, finally turning it round if these fail. In multiparæ with lax vaginae it is easy to pass the Fergusson; but it is more difficult in nulliparæ.

The Fergusson is a favourite speculum with many. It is useless in vaginal and cervical surgery, but with it applications to the cervix can be made very well and easily. When used for making applications to the endometrium, it is advisable to pull the cervix well down with a volsella after the speculum is passed, and to use a straight sound covered with cotton wool.

3. The Neugebauer is like a Sims speculum divided transversely at the middle of the handle (fig. 86). It is also made in suitable sizes.

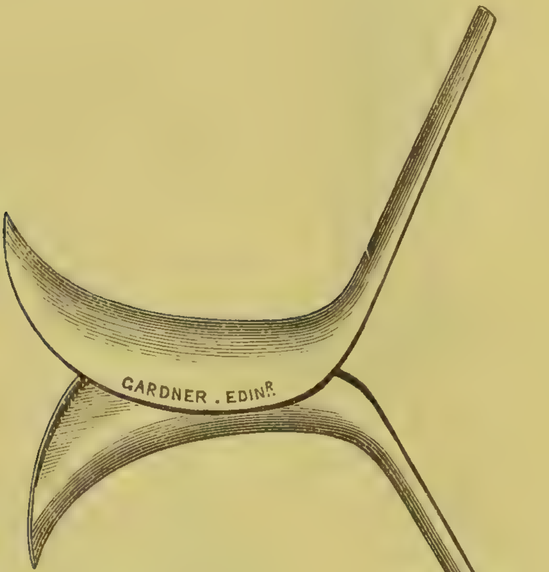


Fig. 86.

Neugebauer's Speculum when passed.

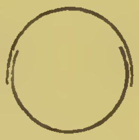


Fig. 87.

Cross section showing relation of blades: the upper is posterior.

Mode of employment.—Warm and oil *two* blades. Introduce one blade (the broader one) with its convexity touching the posterior vaginal wall. Then introduce the other with its convexity touching the anterior vaginal wall and so that its edges fit within the edges of the posterior vaginal wall blade (fig. 87). The beak of the posterior blade is thus in the posterior fornix; that of the anterior blade in the anterior fornix. From their contact a leverage is obtained on separating the handles, by which traction is made on the fornices and the cervical canal more or less everted.

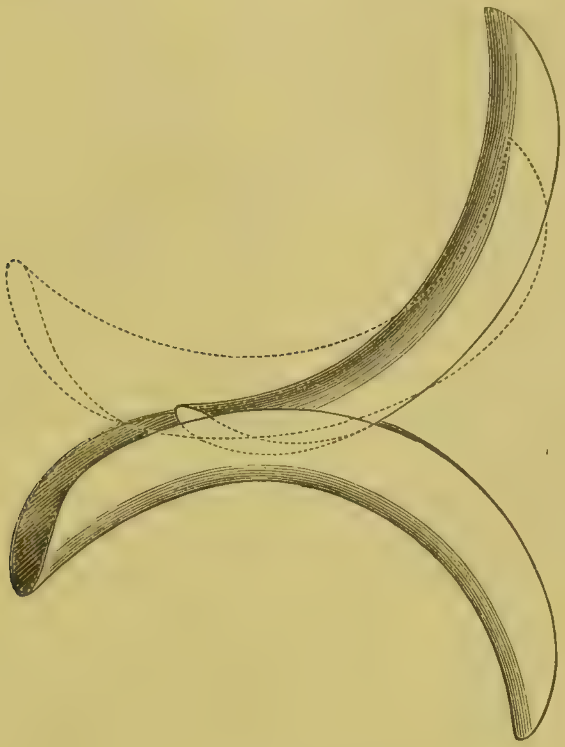


Fig. 88.
Barnes' Crescent Speculum.

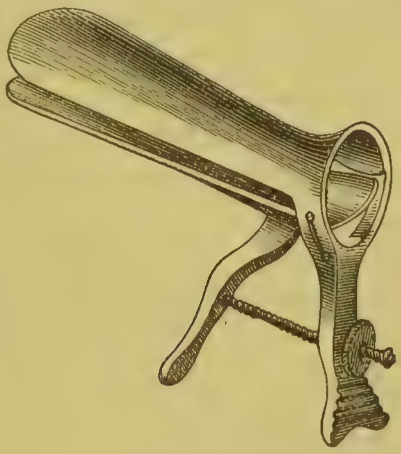


Fig. 89.
Cusco's Speculum.

Fig. 88 shows a useful modification of this by Barnes, known as the Crescent speculum.

The Neugebauer and Crescent specula are useful in making cervical and endometric applications, and are better specula than the Fergusson.

4. The Cusco or Bivalve speculum is shown at fig. 89. It is composed of two blades jointed on to one another at their bases. The blades are opened to the desired distance by pressure on the thumb-piece and kept open by a screw. It is introduced with its blades right and left and then turned so that they lie anterior and posterior, that with the screw being posterior. It is then pushed onwards, and the blades opened and fixed by the screw.

Care should be taken not to catch any of the perineal hairs in the screw; and, in withdrawing it, not to pinch up the vaginal walls.

The Cusco speculum is self-retaining and useful in cervical and endometric applications.

If the patient be placed in the genuvectoral or semiprone posture, the posterior vaginal wall hooked back with the fingers and the cervix drawn down with a volsella, a useful view can be obtained without the aid of any speculum.

USES AND COMPARATIVE VALUE OF THE VARIOUS SPECULA.

The Sims is undoubtedly the best and most scientific speculum we possess. When properly used and aided by the volsella, it leaves nothing to be desired. For operative cases its use is imperative; and it is the only speculum which does not distort the split cervix. It is objected by some—on insufficient grounds—that it is difficult to manipulate, requires a skilled assistant, and exposes the patient unduly.

The Fergusson is easily passed, involves only slight exposure, and is good in very minor gynecology. It gives only a limited view of the vaginal walls. The student should note that it brings the flaps of a split cervix together and somewhat conceals the lesion.

The Neugebauer, on the other hand, opens up the cervical split, and may do this so effectually as to give the impression that there is none. The Fergusson, Cusco, and Neugebauer are all *self-retaining*.

CHAPTER XI.

THE UTERINE SOUND.

LITERATURE.

Simpson, Sir J. Y.—Memoir on the Uterine Sound, Selected Obst. Works: A. & C. Black, Edinburgh, 1871. See *Mundé's* Minor Gynecology and *Thomas* as to Huguier & Lair.

In considering this important gynecological instrument, we take up—

1. Its nature:
2. Preliminaries to its use; when not to use it:
3. Method of use; difficult cases:
4. Employment for diagnosis and treatment:
5. Dangers attending its use:
6. Relation to bimanual and rectal examination.

NATURE.

The sound of Sir James Simpson is not only the classical instrument, but, taken all in all, is probably the best. We describe it, therefore, as a type of the instrument, and then consider its modifications.

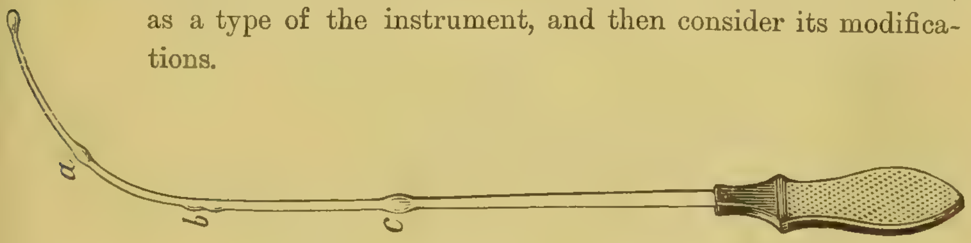


Fig. 90.

Sir J. Y. Simpson's Sound. The 1½ in. notch is not shown. (*a.*) 2½ in. knob.

Simpson's sound is a rod of flexible metal 12 inches long, specially graduated and provided with a suitable handle (fig. 90). It is made of copper, nickel-plated; this is sufficiently pliable to be moulded and yet sufficiently stiff to retain any special shape given to it. Instrument makers often make this sound too unyielding. It should be always pliable enough to be bent with two fingers.

The handle has the shape shown at fig. 91. Note that it is roughened on the same side as that towards which the point of the instrument lies. Consequently, when the sound is in the uterus, we can tell the direction of the point by noting this roughness on the handle.

The graduation is important. 2½ inches from the point is a rounded knob: this is the length of the fully developed unimpregnated uterine cavity. Other markings are at 3 inches, 4½ inches, 5½ inches, and so on up to 8½ inches. The notch, 1½ inches from the point, is of little use and weakens the instrument.

The modifications of this instrument are numerous. The changes are chiefly in its flexibility, lightness, and in the use of another material.

Prof. A. Russell Simpson has modified the instrument by making it shorter, abolishing the 1½ inch notch, and squaring the handle (fig. 91): this gives a very handy and useful instrument. Sims, Emmett, and Thomas have each a special sound. Thomas' is made of hard rubber or whalebone, and he claims that it is specially useful in the case of submucous fibroids. Other modifications are by Matthews Duncan, Protheroe Smith, Aveling, Jennison, Hanks, &c.

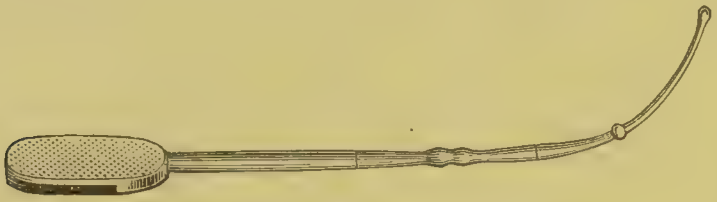


Fig. 91.

Russell Simpson's Sound.

PRELIMINARIES TO ITS USE.

No instrument should have the preliminaries to its use more carefully considered. The rash and careless use of the sound may do immense mischief to the patient. Note then *when not to use it*:—

(1.) The sound is not to be passed during an ordinary menstrual period.

(2.) It is not to be passed in an acute inflammatory attack of uterus, ovaries, pelvic peritoneum, or connective tissue.

(3.) It is not to be passed in cases of cancer of the cervix or body of the uterus.

(4.) It is not to be passed if the patient has missed a menstrual period. This is a safe rule, but admits of limitation as we shall see afterwards.

Before using it—

(1.) Ascertain that the patient has not missed a period.

(2.) Do the bimanual carefully. If in doubt, use the rectal examination aided by the volsella.
(3.) Place the patient in the left lateral posture.
(4.) Give the sound the curve you find the uterus to have.

METHOD OF USE.

After the preliminaries mentioned above, take the sound in the hand and oil its first 3 inches with carbolic oil 1-20. Pass the two fingers of the right hand into the vagina and touch the anterior lip of the cervix, *i.e.*, in front of the os. Guide the sound along the vaginal fingers and make the point enter the os uteri (fig. 92). Pass it in for an inch or so, to fix it.

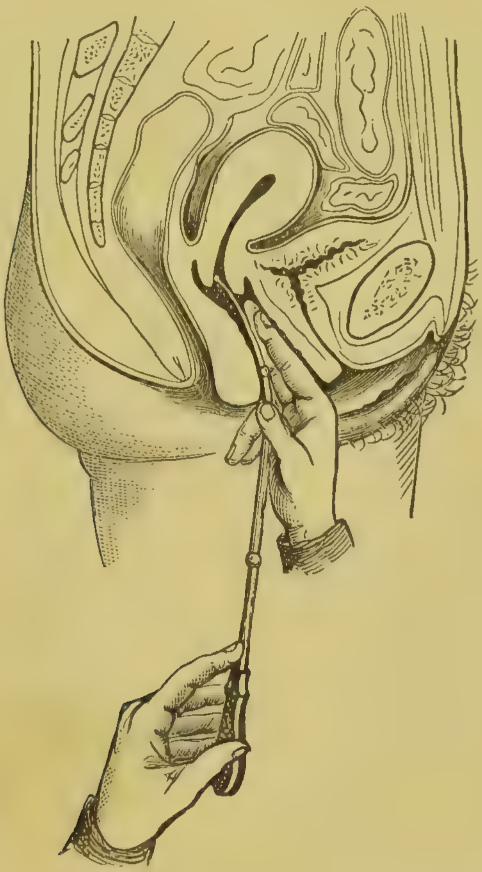


Fig. 92.

First stage of passing the Sound.

If the uterus be retroverted then carry the *handle* towards the symphysis, when the point of the instrument will glide into the uterine cavity until arrested by the fundus (fig. 93). No force is needed. If force seems necessary, the instrument should be withdrawn and a more careful bimanual performed.

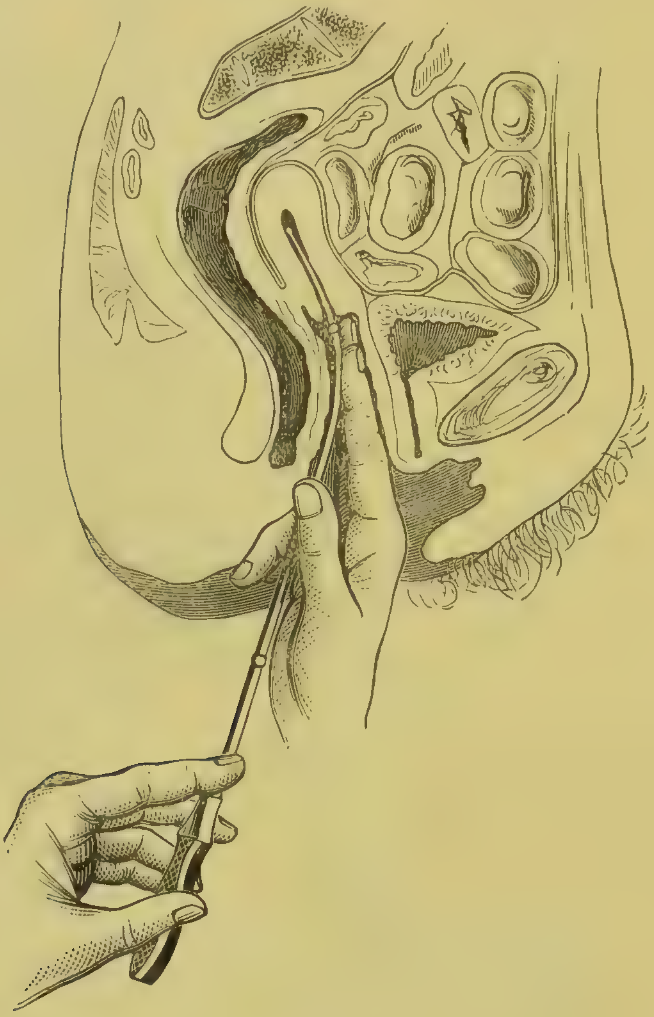


Fig. 93.

Second stage of passing the sound when Uterus is retroverted.

If the uterus lie to the front, the procedure is different. Pass the sound as already described until it has entered the cervix for an inch or so (fig. 92.) Note now that the point of the sound looks back, whereas the fundus lies to the front. Clearly we must make the point look to the front. This is done by turning the handle so that its roughened surface looks to the front. To do this we do not twist round the handle on its long axis, but make it sweep round the arc of a wide semi-circle as in fig. 94. The point, during this manœuvre, remains fixed or nearly

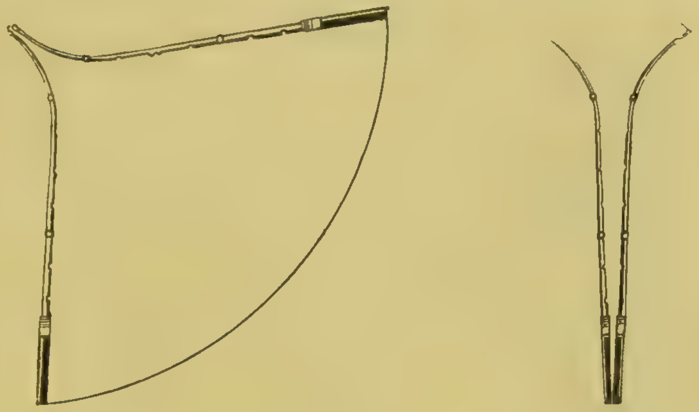


Fig. 94.

(*a.*) Proper method of turning the sound, contrasted with improper method (*b*).

so. Now carry the handle back to the perineum when the point glides into the cavity (fig. 95).

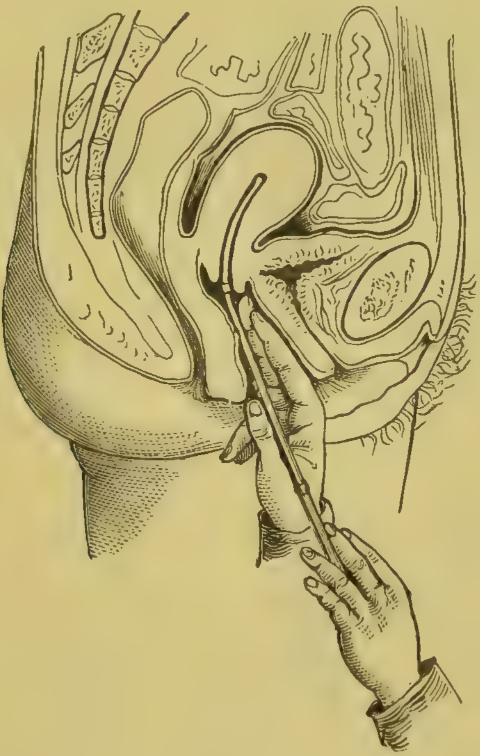


Fig. 95.

Second stage of passing the sound when Uterus is to the front.

Another way of passing the sound, when the uterus lies *to the front*, is as follows. Place the patient well across the bed. Do bimanual and curve sound appropriately. Take the sound in the right hand. Pass two fingers of the left hand, palmar surface forward, into the vagina and touch the posterior lip of the cervix. Carry the sound, point looking forwards, into the vagina; make it enter the os and then carry the handle towards the perineum, when the point will glide on. This method avoids the sweeping round of the handle, and is useful if the uterus is very much anteverted.

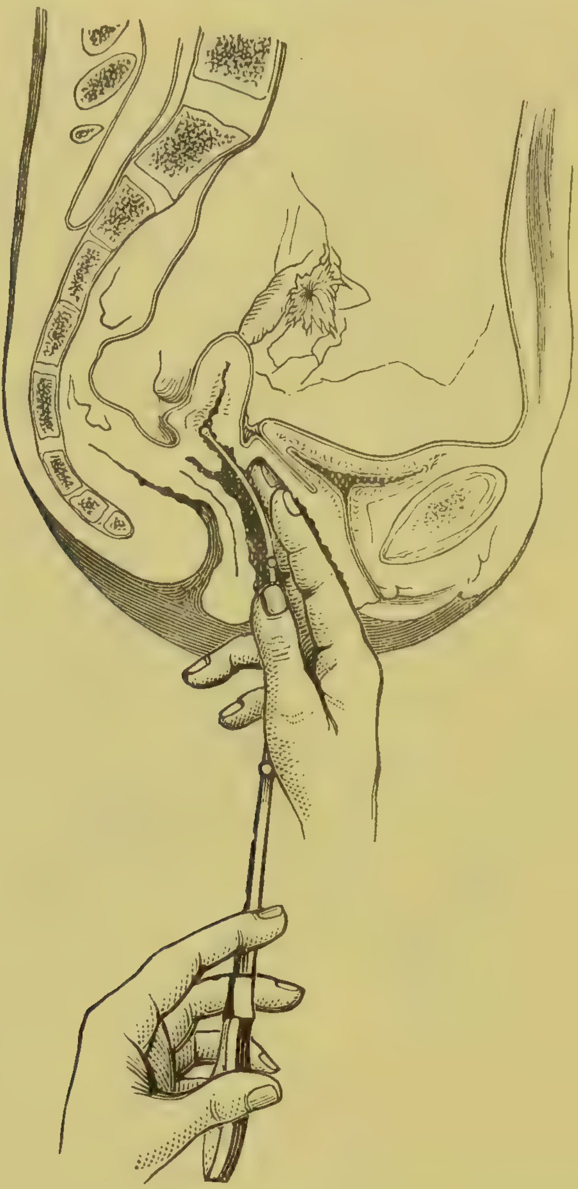


Fig. 96.

Sound arrested (before rotation) in a case of anteflexion.

The sound may be passed after the uterus is drawn down with a volsella, or after the Sims speculum has been introduced.

Difficult cases.—These are chiefly found in markedly anteflexed uteri. The sound passes in so far (fig. 96), but when turned has its point looking too directly upwards. In such cases first draw the cervix down with a volsella, now pass the sound, and should it still stop at the flexion make pressure with a finger in the anterior fornix to push up the fundus. Then get an assistant to carry the handle of the sound towards the perineum.

When the uterine cavity is tortuous as in submucous fibroids a gum elastic bougie—No. 10—may be used to ascertain the length of the uterine cavity. Thomas', Jennison's, or Emmet's sound is specially useful here.

EMPLOYMENT OF THE SOUND FOR DIAGNOSIS AND TREATMENT.

(*A*) Diagnosis

(1.) *Length of uterine* cavity. This varies in different pathological conditions. Thus the cavity is

(*a*) lessened in Superinvolution of uterus,
Atrophic uteri;

N.B.—The sound easily perforates the thinner wall of the superinvoluted uterus. This does no harm. It may also pass along the Fallopian tube.

(*b*) increased in Subinvolution of uterus,
Hypertrophy of uterus,
Cervical hypertrophy,
Endometritis,
Submucous fibroids,
Interstitial fibroids,
Small uterine polypi,
Prolapsus uteri.

(2.) *Direction of uterine axis;* whether retroverted, anteverted, lateriverted.

(3.) *Relation* of axis of uterine body to that of cervix, whether we have anteflexion or retroflexion.

(4.) *Stenosis and atresia at os internum and os externum; tenderness of fundus*, as in endometritis.

(5.) *Mobility of uterus.* This should be ascertained in the following way. Pass the sound as already described. Make the patient turn on her back, and then place two fingers in the vagina palmar surface upwards and touching the posterior lip of the cervix. The sound lies on the palm of the hand, is steadied with the thumb, and can be used to move the uterus gently about as desired. When the uterus is not easily defined by the upper hand in the bimanual, the sound, passed and used as just indicated, enables the upper hand to map it out better. Prof. A. Russell Simpson's sound is specially useful for this manœuvre, as the shortness of the stem and the form of the handle allow the latter to lie flat on the palm.

(6.) *Rough condition of endometrium;* often associated with bleeding when sound is passed.

(7.) *Differential diagnosis between uterine polypi projecting into vagina, and inverted uterus, &c.*—When we have a polypus to deal with, the sound passes in through the cervix for more than the usual distance because the uterine cavity is enlarged. In inversion it passes for only a short distance into the cervix, and is then stopped by its reflexion. Sometimes, however, the neck of the polypus is adherent all round to the cervical canal thus simulating inversion : and in some very rare cases the mucous membrane of the uterus becomes separated and expelled from the uterine cavity, simulating inversion of the whole uterus owing to the separation stopping at the os internum. It is evident that in these last two cases the bimanual clears up the diagnosis, the upper hand feeling the body of the uterus in its normal position in both of them. The sound is only confirmatory of the bimanual.

(*B*) TREATMENT.

(1.) *Rectification of undue angular relation between the uterine body and cervix* (anteflexion, retroflexion) : *dilatation of uterine canal as a whole, or of stricture at os internum.*

(2.) *Replacing of retroverted unfixed uterus.*

(3.) *Application of acids to endometrium on the sound covered with cotton wool.*

DANGERS ATTENDING ITS USE.

The great dangers to the patient from the passage of the uterine sound are abortion, and abrasion of the mucous membrane with absorption of septic matter and resulting pelvic cellulitis or peritonitis.

The former untoward result must be very carefully guarded against. One valuable caution is never to omit the question as to the menstruation, and to ask if it was the usual amount. Some women have a slight discharge of blood at the first period after they conceive, some even menstruate during the whole period of uterogestation. The best safeguard is the careful performance of the bimanual. This soon teaches the practitioner to know whether he has an unimpregnated uterus between his hands, or one at the 2nd or 3rd month of gestation. Special care should be taken when the uterus is retroverted: it may be also gravid; and the pregnancy may, by causing pressure, have induced the patient to consult a medical man. As the bimanual is often difficult, an unwary use of the sound may make the diagnosis disagreeably evident.

The means to avoid setting up any inflammatory disturbance are—to perform the bimanual carefully, to curve and oil the sound properly, and to pass it gently.

SOUND COMBINED WITH BIMANUAL.

The importance of this method of examination has been recently pointed out by Professor A. Russel Simpson, in a paper read to the

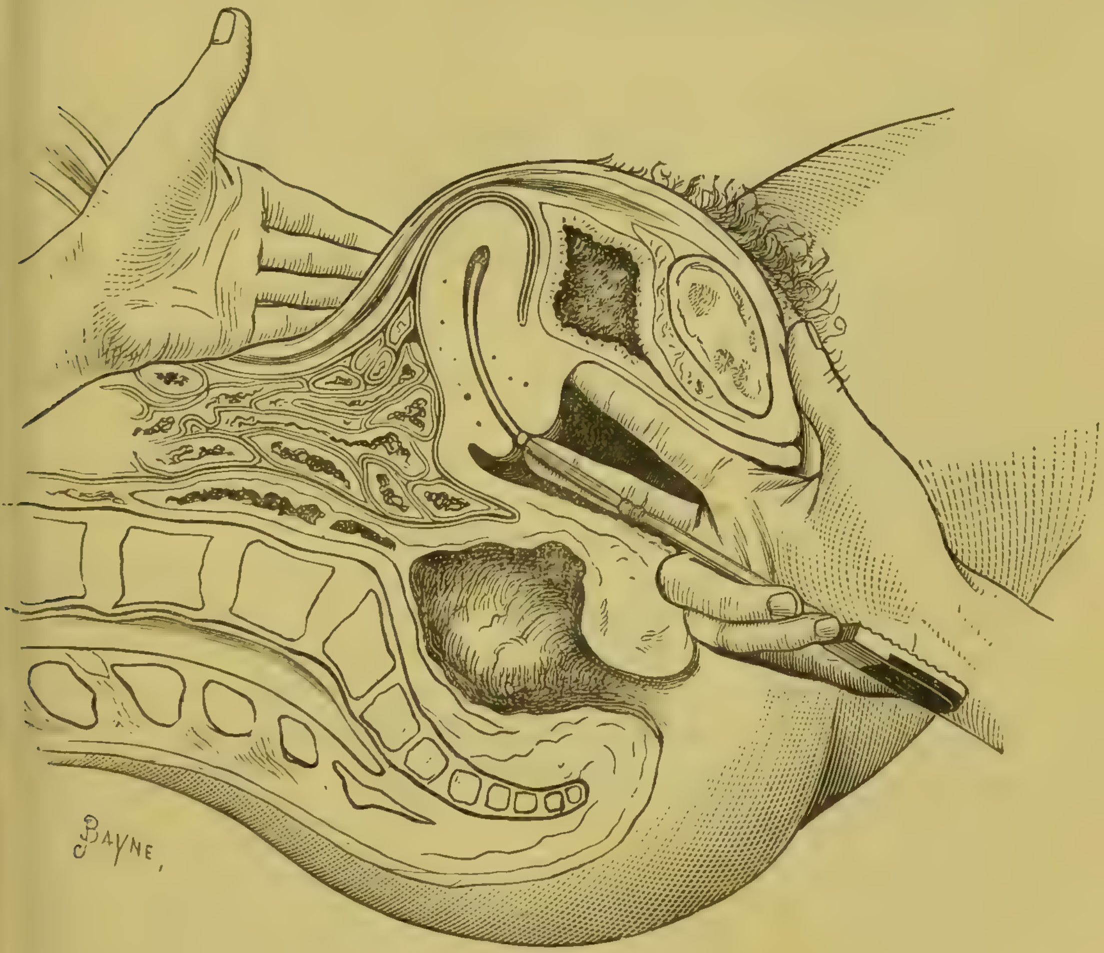


Fig. 97.
Sound combined with Bimanual examination.

Edinburgh Obstetrical Society. For its performance the short sound with the square handle (fig. 91) is necessary. It is of such a length that, when the middle finger is at the knob, the flat surface of the handle rests on the ball of the little finger, against which it is steadied by the flexed little and ring fingers.

The sound is introduced into the uterus in the ordinary way. The fingers are passed into the vagina as for a vaginal examination, and the sound grasped as in fig. 97. The thumb rests on the symphysis pubis. While the middle finger steadies the sound, the index is in the anterior fornix, and the external hand placed as in the ordinary bimanual.

This method is specially useful (*a*) when the uterus is flaccid ; the sound stiffens it, and enables the external hand to define it : (*b*) when, from the presence of small fibroids or pelvic deposits, there is doubt as to what is the fundus uteri; the sound, felt by the external hand in the uterus, indicates the fundus.

RELATION OF SOUND TO BIMANUAL AND RECTAL EXAMINATION.

Before Sir James Simpson introduced the use of the sound, gynecological examination was confined to the exploration of the vagina and cervix.

Simpson gave an immense impulse to gynecology, by placing in the hands of gynecologists an instrument which explored the uterine cavity above the cervix and thus enabling them to obtain a perfection of diagnosis before undreamt of ; thus gynecological examination was made up of a vaginal examination, and then a passage of the sound, due attention being given to the non-existence of pregnancy. J. Y. Simpson recommended, further, the elevation of the uterus with the sound, and its definition with the upper hand.

The next step in gynecology was the use of the two hands—the bimanual and rectal examinations—which in the last twenty years has developed immensely. Consequently, the use of the sound has become more limited. The teaching in this chapter has been based on a recognition of this fact, inasmuch as the use of the sound is recommended only after the bimanual, rectal, and volsellar examinations have been carefully employed.

CHAPTER XII.

THE SPONGE TENT AND OTHER UTERINE DILATORS.

LITERATURE.

Simpson, J. Y.—op. cit. *Sims, J. M.*—op. cit. *Landau :* Ueber Erweiterungsmittel der Gebärmutter : Volkmann's Sammlung No. 187. *Mundé*—op. cit.

HITHERTO we have considered only the means which have placed the vagina and cervix within range of digital examination. In this section we take up the methods by which we get digital examinations of the uterine cavity—methods of the highest practical value, which, like the sound, we owe to the genius of Sir James Simpson.

We therefore consider—

I. *Means of slowly dilating the Cervical Canal by Sponge Tents, Tangle Tents, Tupelo Tents ;*

II. *Means of slowly dilating the Cervical Canal by graduated hard rubber Dilators—Tait's, Hank's ;*

III. *Means of dilating the Cervical Canal by incision and screw Dilators ;* this last will be described under Sims' operation for pathological anteflexion.

Under each we take up—

1. Material or instrument,
2. Purposes for which used,
3. Preliminaries to and method of use,
4. Dangers and contra-indications to use.

DILATATION BY SPONGE, TANGLE, AND TUPELO TENTS.

1. *Material.*—The sponge tent is a cone of good, unbroken, thoroughly dried sponge, impregnated with some antiseptic and then firmly compressed into small transverse bulk, its original length being preserved. When thus prepared and placed under conditions where it can absorb moisture, it swells up and in thus expanding dilates any dilatable structure which may grasp it.

Good sponge tents of various sizes may be had from all chemists.

In order to prevent the antiseptic from volatilizing, the sponge tents are covered with grease. They are provided with a tape at the base to aid their extraction from the cervix after use.

Tents are also made from the ordinary sea tangle (laminaria digitata) (fig. 98) and from tupelo wood (nyssa aquatilis). It is alleged that the tupelo expands more rapidly than either tangle or sponge. Fig. 99 shows its power in this respect. Tangle tents may be had hollow; this facilitates the imbibition of moisture but weakens their expanding powers.

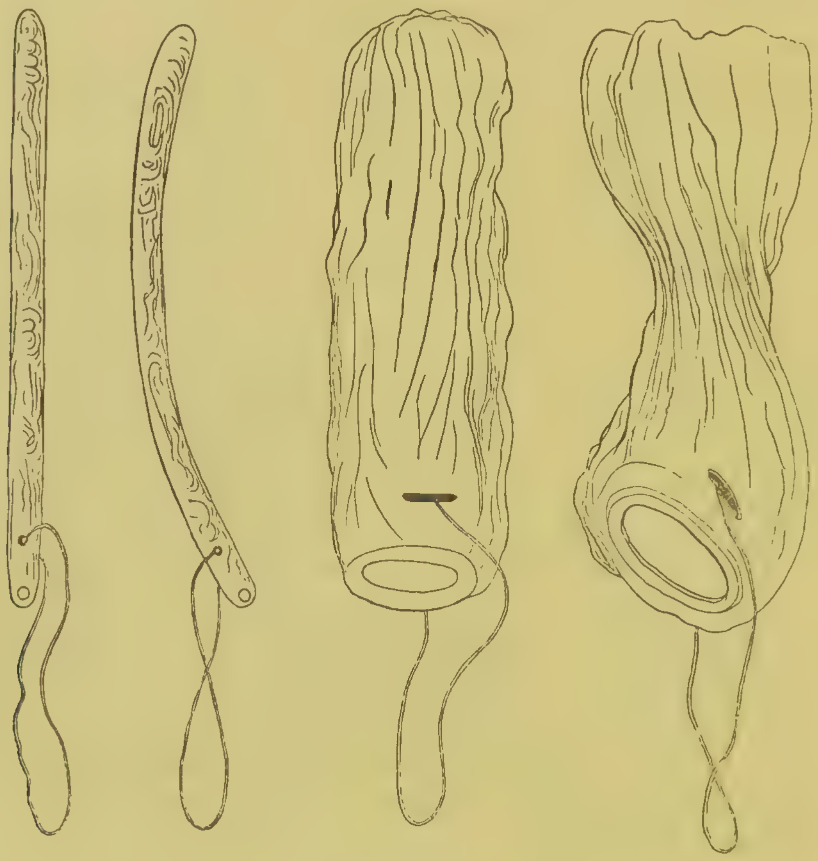


Fig. 98.

Shows on the left a straight and a curved laminaria tent and on the right these tents after expansion. Note how one has been gripped by the os internum (Mundé).

2. *Purposes for which used.* Sponge tents are used as follows:—

(1.) To restrain hæmorrhage in cases of abortion and at the same time dilate the cervix for further interference;

(2.) To dilate the cervix and uterine cavity and enable the practitioner to ascertain and remove the cause of pathological uterine hæmorrhage whether due to endometritis, sarcomata, polypi, or incomplete abortion;

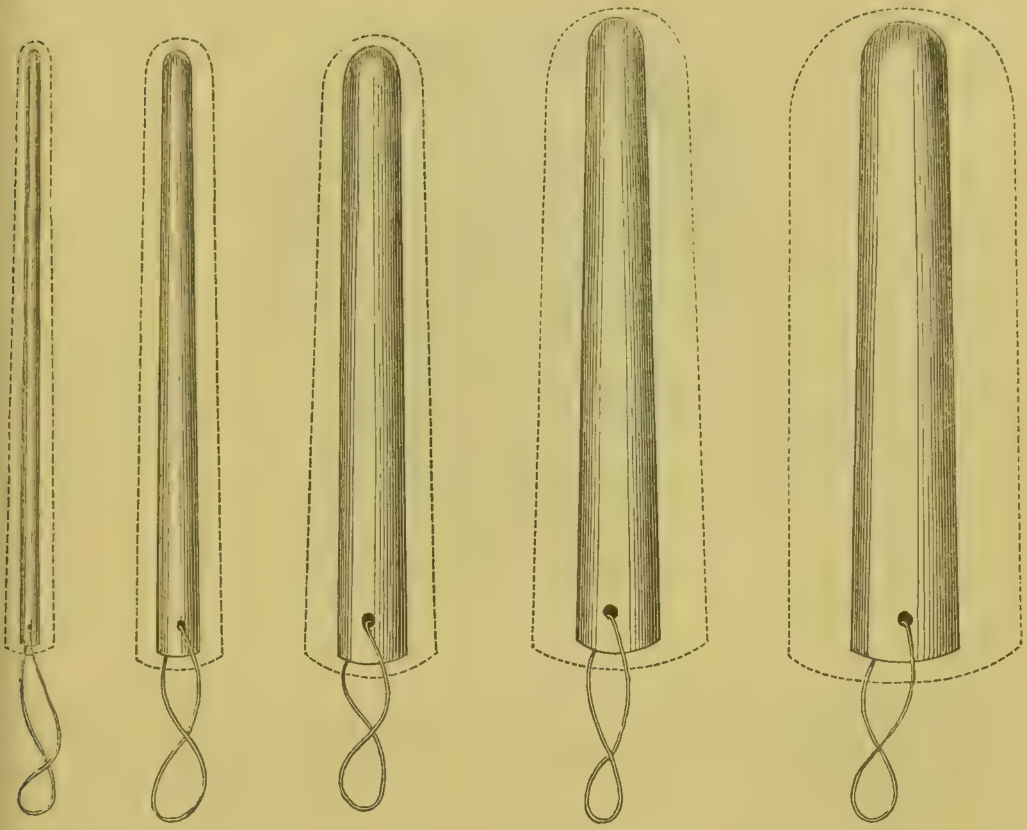


Fig. 99.

Diagram to show relations between size of Tupelo Tent, before and after expansion. The dotted outside line indicates the size of the tent after expansion (Mundé).

(3.) To correct pathological flexions of the uterus, to dilate a stenosed cervix.

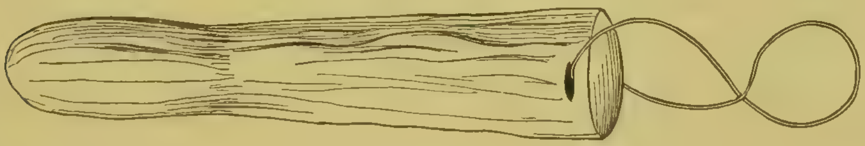


Fig. 100.

Expanded Tupelo Tent with constriction at os internum (Mundé).

Tangle and Tupelo tents have the same scope as the sponge tent. These do not, however, expand so well and thoroughly. Their special advantages are due to their smaller size, and the fact that several may be passed into the same cervix. They are specially useful, therefore, in cases of narrow cervix and flexions. Tupelo tents are highly praised by Landau and Mundé, but are still on trial.

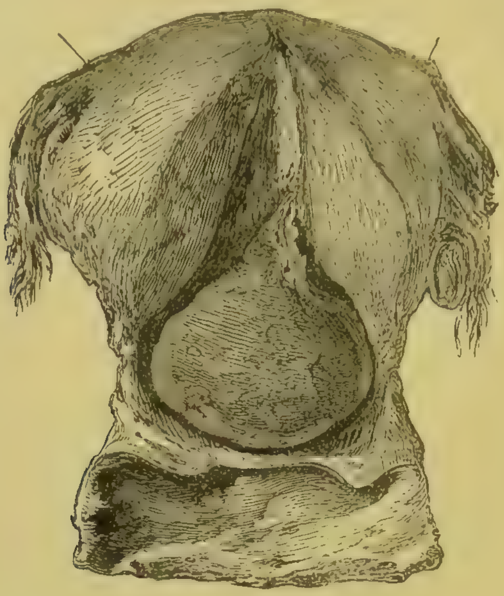


Fig. 101.

Sponge Tent Polypus of Sir James Simpson ½.

Fig. 101 shows a drawing of the uterus, which contained a polypus—obtained from a patient of Sir James Simpson's, who died from the hæmorrhage it caused. It was this preparation which suggested to him the sponge tent.

3. *Preliminaries to and Method of use.*—Tents should not be passed during an ordinary menstrual period, although they often require to be used when pathological bleeding is going on. They should always be passed at the patient's own house; and she should be kept strictly in bed during their use, and for some time after. Before their use, the vagina should be thoroughly washed out with warm carbolic lotion (1-40). Schultze, in passing tangle tents for flexions, first ascertains the uterine curve with the sound; if blood follows its use, he postpones the introduction of the tent for forty-eight hours, in the meantime applying pure carbolic acid to the endometrium. Before using the sponge tent it is advisable to remove most of the grease covering it.

Sponge tents may be passed in various ways.

(1.) The patient is placed in the genufacial, or better, in the semiprone posture. Sims' speculum is passed, the anterior lip of the cervix laid hold of with a volsella and drawn down. The sponge or tangle tent, held in forceps, can then be passed into the cervix (fig. 102).

(2.) The tent is fixed on the spike of an appropriate instrument and is then passed just as the uterine sound; *i.e.*, with the patient placed in the left lateral position, the index and middle fingers carried into the vagina and placed on the anterior lip of the cervix. The tent, fixed on the spike, is passed along these fingers and its point made to enter the cervix. The handle is then rotated and carried to the perineum.

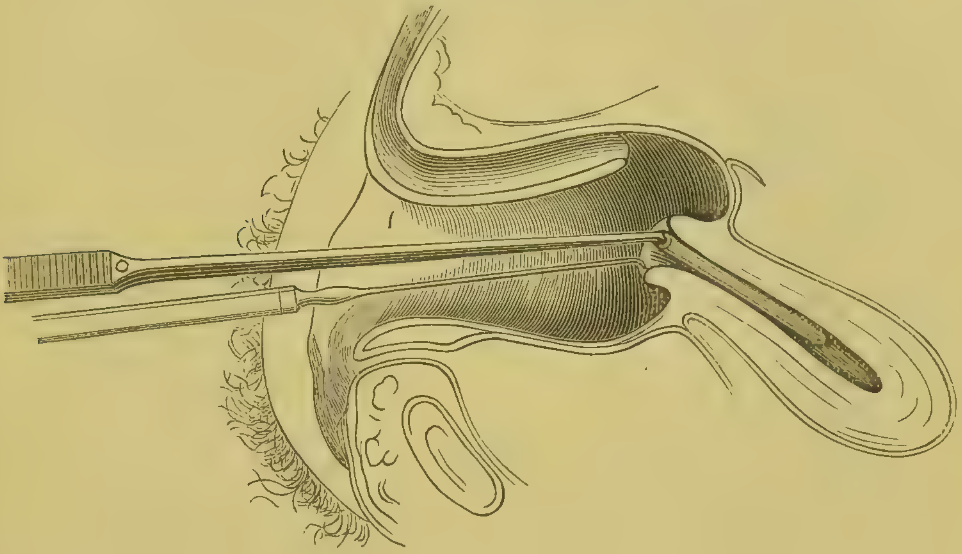


Fig. 102.

Sims' diagram illustrating passage of Tangle Tent. Patient is semiprone, Sims Speculum passed, and cervix steadied with tenaculum. The tent is passed with forceps.

(3.) The patient is placed on her left side and athwart the bed. Pass the volsella, draw the anterior lip of the cervix down. The volsella is not always needed. Place the tent between the index and middle fingers of the left hand with the thumb at its base, carry these fingers into the vagina with their dorsum on the posterior vaginal wall, make the point of the tent enter the cervix and push it on with the thumb.

Another way is to use the volsella as above described, but to fasten it to the bed. Then pass Sims' speculum holding it with the left hand, so that the tent held in the right hand can be passed into the cervix just as one would thread a darning needle.

Tangle and Tupelo Tents.—The same instructions as for sponge tents hold good. Tangle tents, however, when used to correct flexions must first be moulded as follows :—Ascertain the curve of the uterus by bimanual and sound, select a suitable tent and dip it for a few seconds in boiling water, then mould it to uterine curve and pass it as already explained.

Tents require to be left in the cervix for a period varying from 12 to 15 hours, and the vagina should be frequently douched with carbolic lotion during this time. At the end of this period the tent requires to be removed. During the removal no great force should be used. Sometimes the removal is difficult owing to constriction by the os internum or irregularities in the mucous membrane.

The cervix is generally now sufficiently dilated to admit of digital examination of the endometrium. If not, another tent should be employed.

4. *Dangers of Sponge and Tangle Tents and contra-indications.*—The practitioner must keep prominently before him that the use of a tent may prove by no means a harmless measure. Cases of death from septicæmia after the careful and proper use of *one* tent have occurred. The patient runs a risk proportionate to the number used; and, therefore, it is not advisable to use more than two consecutively unless under special circumstances. They are not to be used if acute or sub-acute pelvic inflammation, ovaritis (acute or chronic), carcinoma cervicis, or pelvic hæmatocele be present.

The reason why sponge tents may prove dangerous is only too apparent. The uterine mucous membrane is a lymphatic surface absorbing most rapidly. We cannot insert sponge tents with Listerian precautions; and in addition we have the expanding pressure of the tent forcing septic matter into the mucous membrane. Thus it is quite evident that the consecutive use of two or more sponge tents is dangerous.

To sum up briefly, tents are highly useful in necessary cases—no means at the disposal of the gynecologist gives him in proper cases such valuable help; but he should not forget the risks occasionally arising from their use—risks which should make him cautious but not timid.

DILATATION BY GRADUATED HARD RUBBER DILATORS—TAIT'S, HANK'S.

Tait's dilators consist of graduated vulcanite cones (fig. 103) which can be screwed into a suitable handle. The proximal end of the handle is perforated for elastic bands which, passing in front and behind,

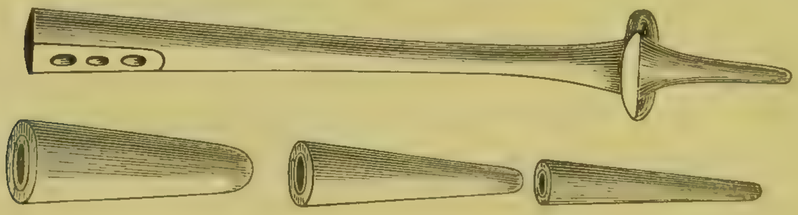


Fig. 103.
Tait's dilators.

are attached to a suitable belt round the patient's waist. Thus the elasticity of the india-rubber causes the cone gradually to pass up into the cervix, dilating it as it goes. By this apparatus, Tait claims to avoid septic infection and to dilate rapidly.

The obvious objection to this apparatus is the amount of watching it entails and the absence of the pelvic curve on the handle.

In cases, chiefly of abortion, where the os is dilatable, Hank's dilators seem serviceable. They have the oval shape seen at fig. 104, are graduated in size and screw into the sigmoid handle. They can be used manually to dilate the cervix until the fingers can be passed through.

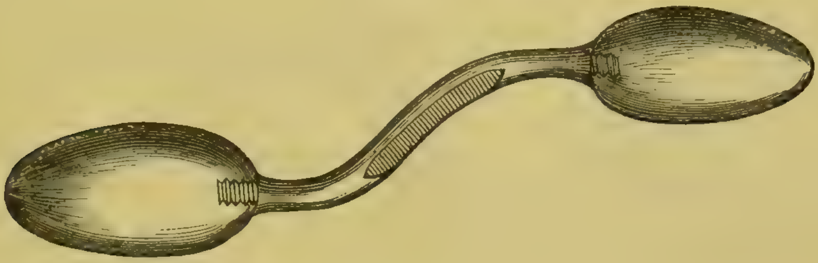


Fig. 104.

Hank's dilator $\frac{1}{1}$.

CHAPTER XIII.

THE CURETTE.

LITERATURE.

Mundé—The Dull Wire Curette in Gynecological Practice : Ed. Med. Jour., XXIII., p. 819. *Noeggerath*—Am. J. of Obst., IV., p. 3. *Recamier*—Memoire sur les Productions Fibreuses et les Fongositès Intrauterines : Univ. Med., 1850. *Sims, J. Marion*—Clinical Notes on Uterine Surgery : London. *Simon*—Die Auslöffelung breitbasiger weicher sarkomatöser und carcinomatöser Geschwülste aus Körperhöhlen : Beiträge zur Geburtshülfe von der Gesellschaft in Berlin, 1872. *Thomas*—Op. cit.

The curette is an instrument, provided with a cutting or with a dull edge, which can be introduced into the uterine cavity previously dilated by tents (although this is not always necessary) for the purpose of scraping off or removing abnormal endometric granulations, sarcoma of the mucous membrane, carcinoma of the cervix, or the remains of an incomplete abortion. This instrument has had a somewhat chequered career. Originally introduced by Recamier, whose instrument was stiff and sharp, it did good work in some cases, but fell into disrepute, undoubtedly deserved, after the record of certain instances where its use had caused perforation of the uterus. Marion Sims and Simon recommend a modified instrument which, owing to its stiff unyielding nature, has found little favour with the profession. Thomas then introduced his flexible dull wire curette, which, popularised by Mundé in an able article, has taken its place in the gynecologist's armamentarium as a useful instrument, to whose employment there is attached no more risk than attends most intra-uterine manipulations.

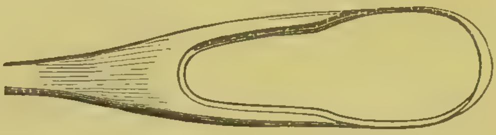


Fig. 105.

Loop of Recamier's Curette.

There are four varieties of curette—(1.) Recamier's (fig. 105); (2.) Simon's (fig. 106); (3.) Thomas' (fig. 107); (4.) Sims' (fig. 108).

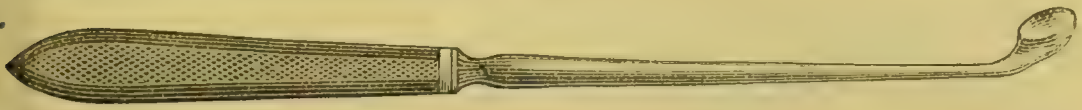


Fig. 106.
Simon's Spoon ($\frac{2}{3}$).

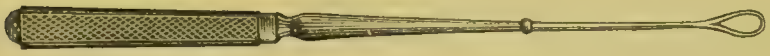


Fig. 107.
Thomas' dull wire Curette, with knob added by Russell Simpson ($\frac{1}{2}$).

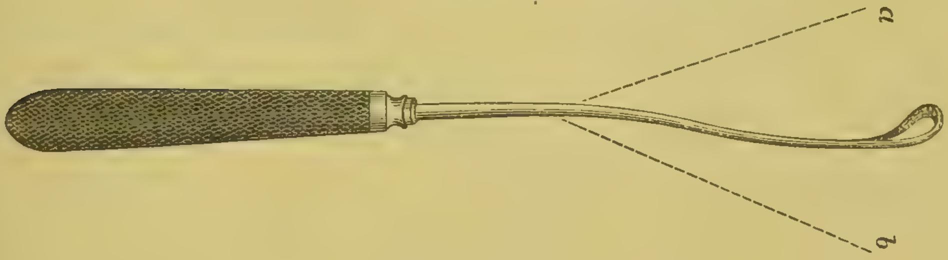


Fig. 108.
Sims' Curette, with Flexible Shank: *a* and *b*, extent of flexibility.

Thomas' instrument is 9 inches long, and has a handle $3\frac{1}{2}$ inches long. The metal portion ($5\frac{1}{2}''$ long) is made of soft copper wire, $\frac{1}{6}$ inch thick near the handle, and $\frac{1}{12}$ inch thick $\frac{1}{2}$ an inch from the end, where it forms a loop (fig. 107) flattened on the scraping edge. Russell Simpson, of Edinburgh, has modified it usefully by adding a knob $2\frac{1}{2}$ inches from the point. This enables one to use it with more precision.

Cases in which the curette is useful.—Recamier's is useful in the same class of cases as Thomas'. Simon's is specially good in carcinomatous cervix, but not in endometric conditions. Thomas' is good in hyperplastic endometritis, sarcoma of the mucous membrane, and, above all, in incomplete abortion.

It is evident, from what has been said, that the curette aids immensely in intrauterine diagnosis. By it portions of abnormal intrauterine conditions can be removed and submitted to microscopic investigation.

How to use Thomas' curette.—Place the patient semiprone, pass Sims' speculum and draw down cervix slightly with volsella. Then pass in the curette, curved if needed (no previous dilatation with tent being required), and gently pass it over the mucous membrane, pressing against it while the loop is being brought down. Do this systematically over the whole anterior and posterior uterine surface, remembering its shape (fig. 14, A).

Curetting may be done single handed when the volsella and Battey's speculum are used, as described at p. 108; or in some cases Fergusson's speculum may be employed, and the cervix then drawn well down with the volsella.

After the curetting is finished, apply pure carbolic acid to the endometrium as given under endometritis.

Cautions and Dangers.—The same precautions should be used as given under sponge tents. The dangers have proved in the authors' hands slight, a minor attack of pelvic peritonitis being the worst.

CHAPTER XIV.

KNIVES; SCISSORS; NEEDLES; SUTURES; ANTISEPTICS; DOUCHES AND SYRINGES; CAUTERY; ANÆSTHETICS.

KNIVES.

For perineal operation, the surgeon's ordinary straight bistoury is sufficient. For vaginal and cervical surgery, long-handled knives with the blade straight or at an angle to the shaft are required (*v.* under operation for vesico-vaginal fistula).

SCISSORS.

These are of the greatest use to the gynecologist and supersede the use of the knife in many instances. Straight, sharp-pointed scissors are valuable in repair of the perineum. Curved scissors are necessary for fistula cases (fig. 109), Bozeman's being specially good. They are right and left, but no woodcut gives a proper idea of their curves. For cervical operations, stout and sharp scissors are necessary. It is very important to remember that the vaginal portion of the cervix is exceedingly tough, and that the ordinary scissors in dividing it slip down or even turn obliquely, leaving the tissue uncut. Kuchenmeister's scissors have this tendency obviated by one of the blades being hooked (fig. 110). Even these scissors sometimes prove unsatisfactory as the finger-and-thumb grip they give is not powerful enough. Fig. 111 shows a pair of cervical scissors devised by Hart, where the handles are like those of bone forceps and are provided with a ratchet. They can,

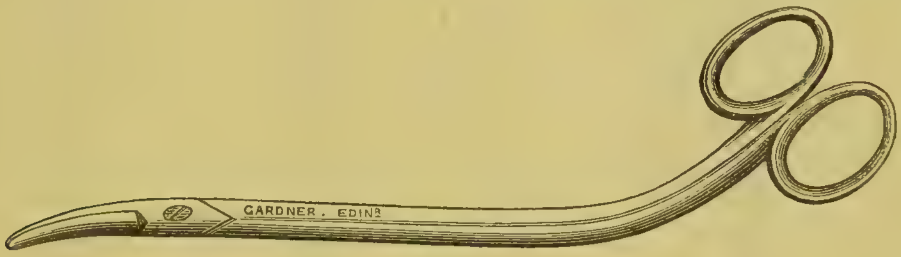


Fig. 109.
Simple curved scissors.

therefore, be grasped in the palm of the hand while being used, and cut even the densest cervix with great precision. Scissors are highly useful in perineal, vaginal, and cervical operations.

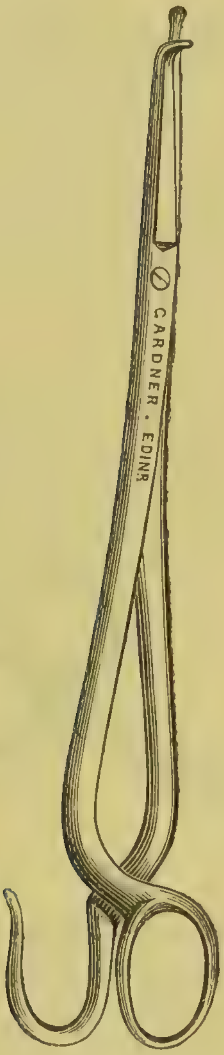


Fig. 110.
Kuchenmeister's scissors.

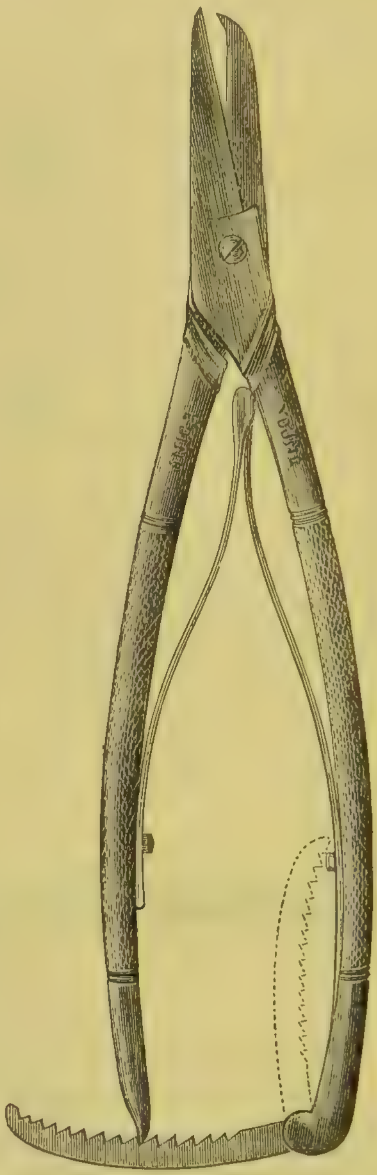


Fig. 111.
Hart's cervical scissors.

NEEDLES.

We need only note that for cervical and fistula operations strong and short needles with only a slight curve (or perfectly straight) are needled. The cervical tissue is so dense that markedly curved slight

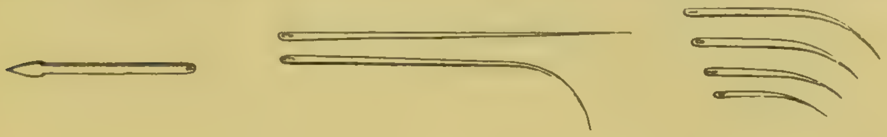


Fig. 112.
Forms of Needles (Emmett).

needles snap. They are passed with a needle holder, of which fig. 113 shows a simple form. Curved or tubular needles set on handles are also useful.

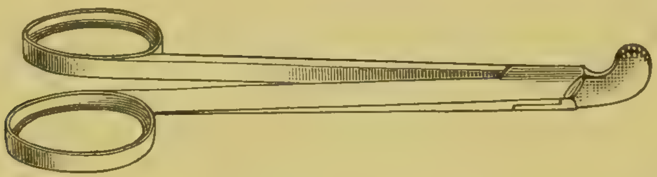


Fig. 113.
Needle-holder.

SUTURES.

These may be silver wire, carbolized silk, catgut, silk-worm gut or horse-hair. For fistulæ, deep stitches, and cervical laceration, *silver wire* is best. For perineal operations, for superficial stitching, as also for stitching the ovariotomy incision, *silk-worm gut* is good. *Catgut* is valuable in the rectal stitches of complete rupture of the sphincter ani. *Carbolized silk* (thin and fine) is best for the ovariotomy pedicle. Simon also used silk in his fistulæ cases. *Horse hair* is useful for superficial skin stitches.

ANTISEPTICS.

This naturally divides itself into two sections: viz., Listerism, as conducted in peritoneal operations; and the modified form of antiseptics carried out in vaginal and cervical surgery. Details on the first of these will be given most conveniently in speaking of ovariotomy. We may remark, however, that at present the question of the propriety of the spray in peritoneal operations is still under discussion. Listerism is directed against the atmospheric surrounding of wounds, and is not in any sense a direct treatment of wounds. In peritoneal operations there is the peculiarity that the peritoneum is an absorbing sac which readily takes up carbolic acid in the form of the finely divided spray. Many eminent ovariotomists allege, therefore, that the spray at present considered necessary for Listerism is hurtful in all peritoneal operations; and that it causes, for the reason already given, high temperatures and kidney complications. This has not been absolutely proved, but is worthy of the careful attention of all operators. Even if sustained, it does not invalidate the high claims of Listerism on general surgery.

During perineal, vaginal, and cervical operations the use of the *douche* is invaluable. For this purpose a large douche apparatus filled with carbolic lotion, 1-40, with long indiarubber tube and small narrow nozzle is employed. It is placed somewhat above the level of the part to be operated on, and under the charge of an assistant plays a small jet on the surface. Apart from its valuable antiseptic action, it clears away blood from the cut surfaces, enables the operator to pare the fistular edges very exactly, and altogether is a most valuable help. It can be suitably warmed; and the excess of fluid flows into any receptacle, such as a foot-bath or large tray on which the legs of the table are placed. Instead of carbolic lotion, boracic or thymol lotion can be substituted.

VAGINAL SYRINGES AND DOUCHES.

For the purpose of applying antiseptic and astringent lotions to the vagina and split cervix, for hot water injections, and for merely cleansing purposes, the vaginal syringe and douche are employed.

Vaginal Syringes.—Fig. 114 shows the well-known Higginson syringe. Valuable as this is, it is difficult for ordinary patients to manage single-handed. For them we should therefore recommend the

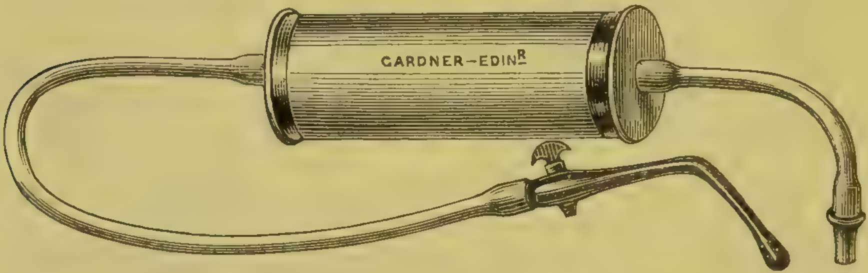


Fig. 114.
Higginson's Syringe.

Vaginal Douche.—A convenient form of this is shown at fig. 115. It can be hung up after being filled, and by the gravitation thus afforded a gentle flow is obtained. The overflow from the vagina is received into any suitable receptacle on which the patient sits.

For patients in bed its use is equally easy. The nurse or attendant should be instructed to make the patient lie on her back, the hips being well raised with a pillow. The pillow itself should be covered with a waterproof or folded blanket. An ordinary basin is then slipped below the hips to receive the overflow.

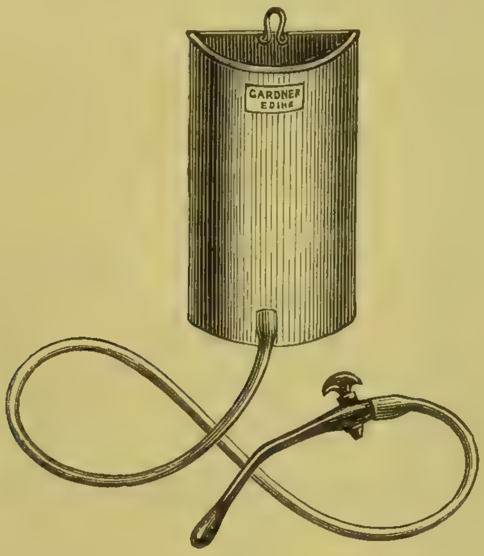


Fig. 115

According to some, the force of the jet of water given by the Higginson is specially valuable—why is not very evident.

The great advantage of the douche is its simplicity. Half of the women who buy a Higginson do not know how to use it, and find it troublesome even when they do know.

The material for injection is varied. Hot water, as hot as the patient can bear it, is invaluable in inflammatory conditions.

Hot carbolic lotion (equal parts of boiling water and 1-20 lotion) is admirable in abortion cases, for cleansing purposes.

In leucorrhœal conditions; injections of alum (ʒj to Oj), sulphate of copper (ʒss to Oj), sulphate of zinc (ʒss to Oj) are good. The general formula for these is—

℞. Aluminis
vel
Cupri Sulphatis.
vel
Zinci Sulphatis ʒj.
Fiat pulv; mitte tales xij.
Sig. To be used as directed.

The patient is told to dissolve one powder, or half of one, in a pint of water, to place this in the douche and use it as already explained.

It is a good plan to make the patient first douche with hot water and then finally, in the dorsal posture, to finish up with the special lotion. After it is finished the dorsal posture should be maintained for ten minutes, and the last of the injection expelled by sitting up.

CAUTERY.

The ordinary cautery may be employed in the treatment of the pedicle in ovariotomy. Details on this are postponed till that is considered.

Fig. 116 shows the well known Paquelin's cautery. In this very elegant and useful instrument the vapour of benzoline is pumped through a slender, hollow cone of platinum, the latter being previously heated in a gas flame or spirit lamp. It speedily becomes red or white hot by the combustion of the vapour, and can then be used.

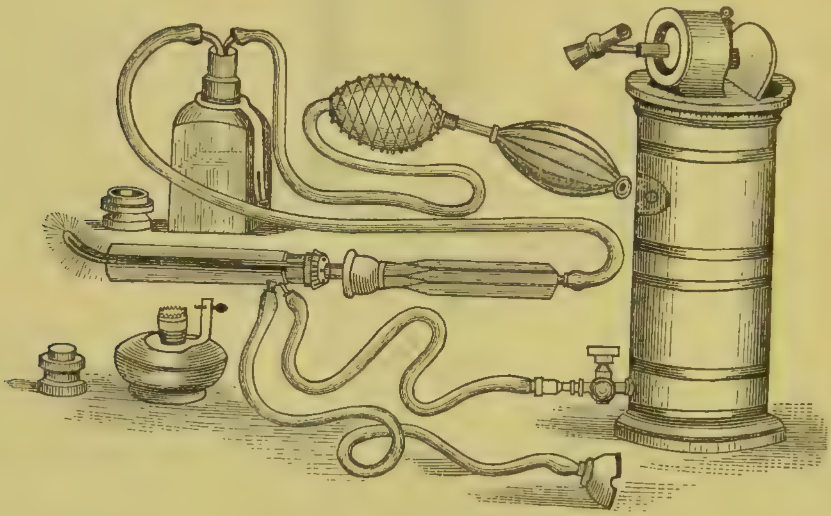


Fig. 116.

Paquelin's Cautery and Wilson's Anti-thermic Shield. The shield is seen covering the rod. The water apparatus is to the right. A spirit lamp is also figured (Mundé).

Note as to its use—(1) To be careful with the benzoline as it is exceedingly inflammable; (2) To heat the platinum cone first (in outermost zone of the flame) before pumping in the benzoline. If the vapour is pumped in before the platinum is hot enough to ignite it, the cone is cooled by its cold stream.

The cautery should be used at a dull heat. When white hot it causes bleeding, because it thoroughly burns the tissues and thus leaves no char to act as a hæmostatic.

When used to cauterize the cervix, care should be taken that the hot metal rod does not touch the vaginal walls. It requires considerable care to avoid this. Various plans have been tried. Thus the rod may be covered except at its terminal two inches with a wooden case which must not touch the metal. More recently Dr Wilson of Baltimore has devised an antithermic shield through which a stream of cold water is sent by an appropriate apparatus (fig. 116). Fig. 117 shows some of the various rods of Paquelin's cautery; and fig. 116 the same covered with Wilson's antithermic shield.

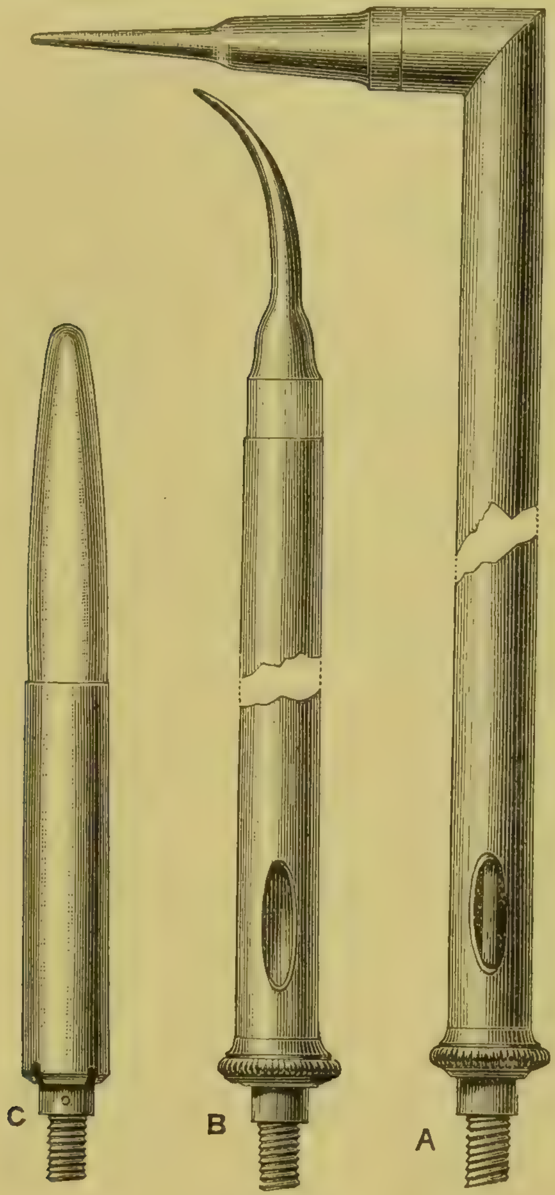


Fig. 117.

Various forms of Paquelin's cones, *A* rectangular; *B* curved; *C* straight.

ANÆSTHETICS.

LITERATURE.—*Brunton, T. L.*—Remarks on One of the Causes of Death during the Extraction of Teeth under Chloroform, Br. Med. J. II., 1875, p. 395. *Chiene*, Chloroform, London Practitioner, January 1877. *Hart, D. B.*—On Death from Insufficient Administration of Chloroform, Ed. Med. J., 1879. *Lister*—Chloroform in Holmes' System of Surgery, Vol. V. : Report of Br. Med. Asso. Committee, Br. Med. J., Vol. I., 1879.

THE chief anæsthetics are chloroform and ether. Other agents or mixtures have been tried, viz., ethidene; mixtures of alcohol, ether, and chloroform; nitrous oxide; bichloride of Methylene: the results have not been satisfactory with these. In the British Medical Report on the action of anæsthetics, ethidene is strongly recommended. Chloroform and ether, however, still remain our most trustworthy agents.

Action of chloroform.—Chloroform when administered to a patient has a perfectly definite effect on the nervous system. Sensation is first abolished, and then reflex action. This is all the effect wished for in any case. If, however, the chloroform be pushed farther, the respiratory centre becomes paralysed so that breathing ceases, and finally the heart stops from paralysis of its ganglia. In almost all cases this is the *sequence in the susceptibility* to chloroform of those parts of the nervous system regulating sensation, reflex action, respiration, and the circulation. Rarely have we the heart affected before the respiratory centre. When first administered it causes a transient rise in the blood pressure, and then a gradual irregular fall. The more recent investigators on this point (see the British Medical Report) found that in dogs chloroform reduced the blood pressure more rapidly and to a greater extent than ethidene, and that ether did not cause any appreciable depression. As the blood pressure is the resultant of the force and frequency of the heart's action and the state of dilatation of the small bloodvessels, it is evident that chloroform when administered to dogs slowed the heart and weakened the vasomotor centre more than ethidene or ether. It should be kept in mind, however, that dogs are very susceptible to the action of chloroform and easily killed by it.

It is wrong to suppose that in every chloroform death the fatal result is caused by an over-dose of chloroform, or by the action of the chloroform on a fatty heart. This is a very common view, but an exceedingly erroneous one.

The one great object of anæsthesia is to prevent the patient's feeling pain. This is one of its most gratifying results, but is not by any means *the* great object in operative cases. One of the most essential aims of its administration is to prevent the reflex transmission of powerful nervous impulses from the part operated on to the heart, or their direct transmission to the respiratory or vasomotor centres. If chloroform be administered to a limited extent so that sensation alone is abolished, and if any large nervous trunk like the Fifth, or large nervous area like the Splanchnic, be irritated, then we may have reflex inhibition of the heart, or paralysis of the vasomotor and respiratory centres; in man, death may result. There are good clinical reports that this reflex inhibition of the heart has caused its stoppage in man. It is sometimes urged against this that no amount of stimulation of the lower end of the cut vagus in a rabbit can permanently stop its heart; in man, however, the conditions are not the same as in the rabbit. Goltz, quoted by Lauder Brunton, gives some most interesting facts in this connection. A frog was decapitated, its heart exposed, and the animal hung with its legs downwards. On tapping the intestines pretty hard, the heart stopped through reflex inhibition of the vagus but soon resumed again. It contracted vigorously but had no blood in it to propel. The irritation of the splanchnics had not only inhibited the heart but so lowered the tone of the vasomotor centre that the veins of the abdominal cavity were widely dilated; and thus the blood, when the animal was vertical, did not reach the opening of the inferior vena cava into the right auricle. When the frog was laid on its back, however, the blood flowed at once to the heart.

This then gives us the proper view of the administration of chloroform in all cases where cutting operations or operations involving large nervous trunks are being performed.

The chloroform must be pushed until sensation and reflex action are abolished, and this state is to be kept up during the operation.

Uses.—Chloroform is used in all cutting operations except in very slight ones; in cases where the straining of the patient prevents the manipulation necessary for accurate diagnosis and treatment; in cases of phantom tumours; and also, when necessary, in cases where vaginal examination of virgins is requisite.

In division of the cervix, curetting of the endometrium, and application of caustics to the endometrium, it is unnecessary unless the patient is unusually sensitive.

Method of administration.—The patient should have no food for three or four hours prior to the operation. Just before the administration of chloroform is begun, half a glass of wine or brandy may be given.

The patient should lie on her back with all fastenings unloosed, and should not sit up. A towel or napkin folded square is taken and chloroform poured on it. Fig. 118 shows a convenient and economic drop cork which can be fitted into any bottle. The amount does not matter. We judge of the state of the patient not by the amount poured on the cloth but by the effect on the patient. If reflex action be not abolished, even though a quart has been used, the patient has not had enough; while, if respiration be affected after a few whiffs, she has had too much.

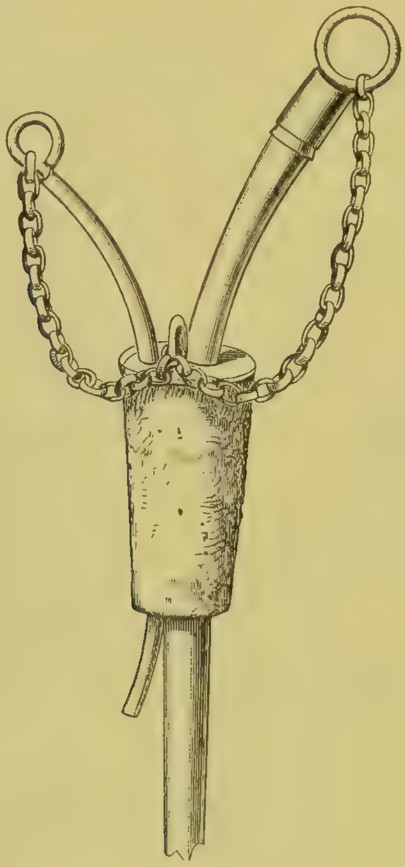


Fig. 118.
Chloroform Drop Cork.

The face of the patient should look to the side and the chin should be kept well away from the sternum. The administrator should keep the chin forward with his right hand. This is, in addition, valuable, as he can always feel the puff of the breath on the palm.

The cloth is to be held not too closely over the face, and the patient directed to take long breaths.

The administrator has to keep two points before him. He is to watch the breathing most narrowly, and to ascertain when reflex action is abolished.

He can watch the breathing well by feeling the puff of the breath constantly on his hand. The abolition of reflex action is generally tested by touching the conjunctiva; when the patient is not fully under, the orbicularis contracts. This is not a perfect test but the best we have.

When reflex action is abolished, no more chloroform is to be given; should it show signs of returning, fresh chloroform is put on the cloth.

DANGERS.

These may be the following:—

(1.) *Asphyxia,*

(2.) *Reflex inhibition of Heart or respiratory or vasomotor centres.*

(1.) *Asphyxia.*—This may arise early from fainting, muscular relaxation allowing the tongue to fall back on the pharynx; or from closure of the glottis, owing to paralysis of its intrinsic muscles. The marked extension of the head already insisted on prevents the former from happening. If it arise, the tongue is to be pulled well forward with a pair of forceps. Foulis recommends that the tongue be pressed forward by a spatula or spoon applied at its root.

When asphyxia arises from paralysis of the respiratory centre owing to an overdose of chloroform, the treatment is immediate stoppage of the administration of the chloroform *and artificial respiration by Sylvester's or Howard's method for hours if necessary.* The head should be kept hanging over the edge of the table, so as to send blood to the respiratory centre; or the patient may be inverted (Nelatonized).

(2.) *Reflex inhibition of the heart or respiratory or vasomotor centres.*—This can only happen when there has not been given sufficient chloroform to abolish reflex action. It is by no means an uncommon thing, therefore, for the patient to die because sufficient chloroform has not been administered; sensation alone has been abolished when the operation is begun. The usual account is that "the patient gave a start when the first incision was made, and died." In some cases this has happened after only a teaspoonful had been poured on the cloth. Yet this is often called "a death from chloroform."

Contra-indications.—Every patient on whom an operation is to be performed may have chloroform; if the operation is indicated, so is chloroform. If the patient has a weak heart, then chloroform is imperative for any operation; it must be given till reflex action is abolished, as any reflex inhibition of the heart is specially dangerous here.

Occasionally, chloroform causes severe vomiting after the operation. For this reason Keith always uses ether instead. Vomiting during the operation is dangerous only when any solid vomit regurgitates back into the trachea; tracheotomy may then be necesssary.

Sickness after the operation is treated by the sucking of ice and the application of a mustard leaf to the pit of the stomach.

PART II.

DISEASES OF THE FEMALE PELVIC ORGANS.

WE classify the diseases of the female pelvic organs according to the structure which is affected, and devote one section to each group of affections as follows :—

Section III. The Peritoneum and Connective Tissue ;
„ IV. The Fallopian Tubes and Ovaries ;
„ V. The Uterus ;
„ VI. The Vagina ;
„ VII. The Vulva and the Pelvic Floor.

Further, we shall consider under special sections disturbances of the following functions :—

Section VIII. The Menstrual function ;
„ IX. The Reproductive function.

Finally, we shall devote one section to affections of the neighbouring organs :—

Section X. The Bladder and the Rectum.

Syphilis and Chlorosis, as they are constitutional conditions, will be considered in the Appendix, in which also a chapter will be given to Case-taking and to Gynecological Literature.

SECTION III.

AFFECTIONS OF PERITONEUM AND CONNECTIVE TISSUE.

CHAPTER XV. Pelvic Peritonitis and Pelvic Cellulitis.
,, XVI. Pelvic Hæmatocele.

CHAPTER XV.

PELVIC PERITONITIS AND PELVIC CELLULITIS.

LITERATURE.

Bandl—op. cit. *Barnes*—op. cit. *Bernutz and Goupil*—Clinical Memoirs of the Diseases of Women, Vol. II. : New Sydenham Society, Meadow's translation, 1866. *Churchill*—On Inflammation and Abscess of the Uterine Appendages : Dub. J. of Med. Sc., 1843. *Doherty*—On Chronic Inflammation of the Uterine Appendages after childbirth : Dub. J. of Med. Sc., 1843. *Duncan, J. Matthews*—A Practical Treatise on Perimetritis and Parametritis : Edinburgh, A. & C. Black, 1869. *Freund*—op. cit. *Lusk*—op. cit. *Mundé, P. F.*—The Diagnosis and Treatment of Obscure Pelvic Abscess in Women, with remarks on the differential Diagnosis between Pelvic Peritonitis and Pelvic Cellulitis : Archives of Medicine (E. C. Seguin, Ed.), Vol. IV., No. 3. *MacDonald, Angus*—Three Cases of Parametritis, with observations on its Diagnosis and Treatment : Ed. Med. J., 1880, p. 1060. *Noeggerath*—Latent Gonorrhœa especially with regard to its influence on Fertility in Women : Am. Gyn. Tr., Vol. I. *Olshausen*—On Puerperal Parametritis and Perimetritis : New Syd. Soc. Transl., 1876. *Priestley, W. O.* Pelvic Cellulitis and Pelvic Peritonitis : Reynold's System of Medicine, Vol. V. *Schroeder*—op. cit. *Schultze, B. S.*—Ueber die Pathologische Anteflexion der Gebärmutter und die Parametritis Posterior : Hirschwald, Berlin, 1875. *De Sinéty*—op. cit. *Simpson, Sir J. Y.*—On Pelvic Cellulitis and Pelvic Peritonitis, Clinical Lectures on the Diseases of Women (edited by Simpson, A. Russell) : Edinburgh, A. &. C. Black, 1872. *Simpson, Russell*—Quarterly Report of the Royal Maternity and Simpson Memorial Hospital : Ed. Med. Journal, Vol. XXVI., p. 1059. *Spiegelberg*—Remarks upon Exudations in the neighbourhood of the Female Genital Organs : Second Series of German Clinical Lectures, Translated by New Sydenham Society, 1877. *Tait, Lawson*—On the Treatment of Pelvic Suppuration by Abdominal Section and Drainage : Tr. of Med. Chi. Soc., Lond., 1880, p. 307.

In considering the subjects of pelvic peritonitis and pelvic cellulitis it will be convenient to take up some preliminary matter and then to consider separately each condition under the following heads :—

Nature.
Pathological anatomy and varieties.
Etiology.
Symptoms.
Physical signs.
Diagnosis : Differential diagnosis.
Course and results.
Prognosis.
Treatment.

Preliminary considerations.—The subjects of pelvic peritonitis and pelvic cellulitis are by no means thoroughly worked out. The literature is extensive, but not so valuable as medical literature often is. This arises from various causes, among which the most important is the change in the theories as to the anatomical site of pelvic inflammatory conditions. Nonat and Simpson contended that pelvic peritonitis and pelvic cellulitis were distinct affections, and considered the latter as being of frequent occurrence. Then Bernutz and Goupil turned the tide for some time by their able work, where they classed almost all pelvic inflammatory affections as peritonitic. They, however, greatly underrated the amount of connective tissue surrounding the cervix, just as Guerin has more recently written in the same strain as to the connective tissue of the broad ligaments; and Le Bec, too, has endeavoured to support the opinions of the latter by his observations on the lymphatic distribution of the broad ligament.

There is now little doubt that Bernutz and Goupil pushed their views too far; so that in America, Germany, and Britain, gynecologists now consider pelvic inflammation as either peritonitic or cellulitic. Clinical, anatomical and pathological facts are each day putting this view on a firmer basis. The fact however that these diseases are not rapidly fatal, and that generally we get *post mortems* only of advanced or resolved cases, along with the admitted difficulty of exact clinical differentiation, renders our knowledge at present much less complete and exact than could be wished.

Finally, we must note that both diseases are always combined. Thus in a marked pelvic peritonitis there is always some pelvic cellulitis, and in a marked pelvic cellulitis always some pelvic peritonitis. This is quite analogous to what is found in pleurisy and pneumonia.

PELVIC PERITONITIS.

SYNONYMS.—Perimetritis: Pelveo-peritonitis.

NATURE.—An acute or chronic inflammatory condition affecting chiefly the pelvic peritoneum.

PATHOLOGICAL ANATOMY AND VARIETIES.

In the early stages, the peritoneum is injected and the epithelial cells dull in lustre. Soon, in marked cases, fibrinous or serous fluid is poured out: the former stiffens the peritoneum and often causes extensive adhesions between uterus and rectum, Fallopian tubes and ovary;

the latter either remains free in the cavity, or becomes encysted by the false membranes already alluded to, often making Douglas' pouch to bulge down. In bad cases, pus is the secretion. We may therefore speak of simple pelvic peritonitis, adhesive pelvic peritonitis, and serous or purulent pelvic peritonitis. These, however, are mere varieties.

ETIOLOGY.

The causes of pelvic peritonitis are numerous. They are chiefly the following :—

1. The previous existence of a pelvic cellulitis; pelvic hæmatocele ; ovaritis ; ovarian tumour ; fibroid tumour ; tubercle, and carcinoma.
2. Childbirth and abortion.
3. Gonorrhœa.
4. Latent gonorrhœa in the Male.
5. Menstruation.
6. Venereal excess.
7. Instrumental examination by the sound : stem pessaries ; sponge tents ; tangle tents.

1. *The previous existence of a pelvic cellulitis ; ovaritis : ovarian tumour ; fibroid tumour ; tubercle, and carcinoma.*

We have already noted that marked pelvic cellulitis is always associated with some pelvic peritonitis. The pelvic peritoneum and cellular tissue are adjacent and intimately connected with one another in their vascular, nervous, and especially in their lymphatic supply. We have already seen how the stomata of the peritoneum communicate with subendothelial lymphatics. In the same way we can understand a pelvic peritonitis arising secondarily from ovaritis.

Ovarian tumours often set up pelvic peritonitis after being tapped as well as from their mere mechanical pressure—a fact of the highest importance as regards the operation of ovariotomy. Small fibroids, tubercle and cancer do the same, and thus give rise to considerable difficulty in diagnosis. Dr Foulis of Edinburgh has thrown much light on malignant peritonitis, by showing that in the ascitic fluid we find very characteristic cell clusters. This will again be referred to under ovarian tumour.

2. *Childbirth and abortion.*—When an inflammatory lesion follows these, it is generally cellulitic and, as we shall afterwards see, septic. Pelvic peritonitis often enough follows, and is then probably likewise septic. According to Lusk, who quotes Steurer's as yet unpublished

researches, "bacteria pass along the lymphatics . . . and perforating those beneath the peritoneum set up pyaemic peritonitis." At the same time, the peritonitis may result from simple bruising.

3. *Gonorrhœa* is one great cause of peritonitis. It may result from actual spread of the gonorrhœal virus; or be sympathetic, like orchitis in the male. In the former case the purulent infection probably passes along the Fallopian tubes and out at the fimbriated end, setting up a severe peritonitis. In puerperal woman, gonorrhœa is by no means innocent therefore, as the following case by Russell Simpson shows:—

"J. C., primipara, prostitute, æt. 18, admitted to the hospital and was delivered of a male child. On the afternoon following severe peritonitis set in, which proved fatal in ten days. On *post mortem* the abdomen contained ℥ viii. of yellow pus. Surface of intestines covered with recent fibrinous lymph becoming purulent. Mucous membrane of bladder much congested and in certain areas rough and granular. . . . On squeezing the Fallopian tubes a large quantity of pus was expelled and the tubes appeared to be much distended with it. Mucous membrane much congested." (Report by Dr D. J. Hamilton.)

4. *Latent Gonorrhœa in the Male.*—By this term Noeggerath of New York, who first directed attention to the subject, means a gonorrhœa in the male apparently cured, which some time after—even two years—infects a virgin vagina, causing discharge and pelvic peritonitic disturbance. This subject comes up under Gonorrhœa. The authors have seen some cases bearing out Noeggerath's views.

5. *Menstruation.*—It can be readily understood how the pelvic congestion of menstruation may in certain cases cause peritonitis. There may be some blood effused which sets it up.

6. *Venereal excess* in prostitutes and newly married women may, for evident reasons, have peritonitis as its sequel.

7. *Instrumental manipulation.*—This is alluded to under the various instruments and needs mere mention here.

We append Bernutz's analysis of the causes of pelvic peritonitis in ninety-nine cases.

43 occurred in puerperae.
28 „ after gonorrhœa.
20 „ during menstruation.
8 traumatic {
  3 due to venereal excess.
  2 „ syphilitic diseases of cervix.
  2 „ introduction of the uterine sound.
  1 „ use of vaginal douche.

SYMPTOMS AND PHYSICAL SIGNS.

A. Acute Peritonitis.

Symptoms:—Increased, full, and bounding pulse; increased temperature; rigor; shooting pains very severe.

Physical Signs:—On palpation of lower part of abdomen the patient complains of pain; and the abdominal muscles, apart from the patient's volition, resist pressure. She lies usually on her back, and with both legs drawn up.

On vaginal examination the vagina feels hot and tender, and pulsating vessels may be felt in the fornices.

After exudation is present we may feel one or other of the following conditions.

1. A flat hard non-bulging condition of the fornices round the cervix, which is not displaced to one or other side but is immobile. The usual simile, and a very good one, is that it feels as if plaster of Paris had been poured into the pelvis.

2. An indistinct fulness high up in the pelvis. This is from free serous exudation.

3. A bulging tumour behind the uterus displacing it to the front; or a tense fluid laterally, apparently in the site of the broad ligament (fig. 45). The former is due to encysted serous effusion in the pouch of Douglas, the latter to encysted serous fluid behind the broad ligament displacing it forwards. As a general rule these effusions are high in the pelvis and symmetrical. Sometimes the bulging retro-uterine tumour feels nodulated after a time; this is from extension of the inflammatory condition into the subjacent connective tissue.

Note that the bimanual is often impossible owing to the rigid condition of the fornices and abdominal muscles. The bimanual estimation of effusion is often wrong owing to the fact that we feel the rigid peritoneal membrane through the fornices, and from the rigidity of the abdominal wall draw the conclusion that there is effusion between these. Careful examination under chloroform is of the highest value in such instances.

B. Chronic Peritonitis.

Symptoms:—These are chiefly backache, sideache, leucorrhœa, increased menstruation and sterility. Pain is the most marked symptom, and is felt most on vaginal examination or coitus.

Physical Signs:—On vaginal examination obscure thickening is felt in the fornices. The uterus, if displaced, is often markedly anteverted from cicatrization of the peritoneum in the pouch of Douglas. Very frequently it is retroverted and bound down by adhesions, which may, however, allow of a certain range of mobility. The chronic form remains often as a sequel to the acute; but may develope slowly of itself.

DIFFERENTIAL DIAGNOSIS.

This will be considered under Cellulitis.

COURSE AND RESULTS.

Very often the inflammatory condition clears up. The adhesive form leaves its mark in the shape of pathological anteversions, and retroversions bound down (fig. 119). The Fallopian tubes may have their ovum-conducting power so interfered with that an incurable sterility results. When they are not injured to this extent, conception may occur; and the adhesions may ultimately yield to the stretching brought to bear on them by the developing uterus. They may, however, resist this and cause abortion.

Occasionally, pelvic peritonitis becomes general and is then rapidly fatal.

Serous exudations may become absorbed; pus may dry up, but oftener perforates into the bladder, bowel, or roof of vagina.

PROGNOSIS.

Each case must be judged on its own merits. We give, therefore, only general hints.

As to life.—Pelvic peritonitis is not usually fatal. If it becomes general and is septic or gonorrhœal in its origin, then the prognosis is very grave. A high and rapid pulse of long continuance, with a temperature not in the same ratio, also makes prognosis grave.

As to sterility.—This is difficult to give, and often time alone settles the point. The mechanical closure by pressure of the Fallopian tube—a condition not diagnosable—and ovaritis rendering ovulation impossible, are conditions often produced and are both incurable. Prognosis as to conception should always be cautious, and never absolute when the peritonitis has been extensive.

TREATMENT.

A. Acute pelvic peritonitis.—*a. Prophylactic.*
b. General.—(1.) Diet. (2.) Septicity. (3.) Pain. (4.) Pulse and Temperature.
c. Local.

a. Prophylactic.—This is of the very highest importance. The practitioner should always attend most scrupulously to antiseptic cleanliness in all vaginal, cervical, and uterine operations. Cautions on these points are given under the head of the respective operations and need not be here repeated.

During their menstrual periods young patients should avoid all undue fatigue, late hours, violent exercise, alternate exposure to heat and cold when insufficiently clad.

Gonorrhœa should be thoroughly treated, especially during pregnancy.

b. General.—Under this we attend to diet, and employ remedies intended to combat the septic condition when present, to alleviate pain, and to bring down pulse and temperature.

(1.) *Diet.*—In the early stages of inflammation, this should be chiefly milk iced or mixed with lime water, potash water or lemonade. Among the better classes, apollinaris or seltzer water can be used. Seltzer water helps to combat the constipating tendency of milk diet.

When the patient's strength is reduced and the pulse flagging, nutritious stimulating food must be frequently given. Milk should be still continued; but beeftea or strong soups, every two or three hours, must be added. Stimulants are requisite at this stage, viz., brandy, champagne, gin, or whisky. Care must be taken to give these in their stimulating doses, *e.g.*, for brandy, a table-spoonful every two or three hours.

The regulation of the bowels is not requisite in the early stages; but in the later periods must be looked after. Gentle aperients such as compound liquorice powder, colocynth and hyoscyamus pills, castor oil, &c., can be used; and occasional enemata are of service. Enemata should not, however, be used exclusively, as this may lead to the formation of troublesome scybala.

When suppuration is tedious, it should be seen that no bed sores form; and iron and quinine should be administered.

℞. Ferri et Quiniæ Citratis gr. lxxx.
Aquæ ℥ij.
Sig. Teaspoonful thrice daily.

or

℞. Ferri et Ammoniæ Citratis gr. lxxx.
Aquæ ℥ij.
Sig. Teaspoonful thrice daily.

The bitterness is best masked by dilution with water and not with orange or other syrups, which derange the stomach.

(2.) *To combat any septic condition.*—We know no specific medicine for this purpose. A favourite one is the muriate of iron of the Ed. Phar.

℞. Tincturæ Ferri Muriatis (Ed. Phar.) ℥ij.
Sig. Thirty drops thrice daily in a glass of water. Water should be drunk freely after the dose is given, and the mouth thoroughly rinsed.

Quinine may be used for the same purpose.

℞. Quiniæ Sulphatis gr. xxiv.
Acidi Sulphurici diluti ʒij.
Aquam ad ℥vj.
Sig. Tablespoonful thrice daily in water.

(3.) *To alleviate pain.*—Nothing is so good for this as the hypodermic injection of morphia deep into the deltoid.

℞. Morphiæ Bimeconatis gr. viij.
Spiritus Vini Rectificati miij.
Aquæ ℥j.
Sig. For Hypodermic injection. Fifteen minims contain ¼ grain of Morphia.

The bimeconate is a good preparation and causes less sickness than other forms; as one drachm of this preparation contains one grain of morphia and as the hypodermic syringe holds only 30 min., it is impossible to give an overdose to an adult.

When doses larger than a grain are needed, the hypodermic solution of the acetate of morphia (B. P.) may be employed. Twelve minims contain 1 grain, and therefore 3 minims is the first dose for an adult.

It is a good plan for the practitioner to keep the ordinary 8 gr. to ℥i solution, and to prescribe the stronger solution only for any patient requiring it; in this way he avoids carrying two solutions of different strength by which mistakes might arise. The *stronger* solution is prescribed as follows:—

℞. Injectionis Morphiæ Hypodermicæ (B. P.) ʒij.
Sig. For Hypodermic injection. Three minims contain ¼ grain Acetate of Morphia.

Chlorodyne (25 min); Battley's solution (liquor morphiæ sedativus, 25 min.); or Laudanum (tinctura opii, 25 min.) may be used. More useful than these are morphiæ suppositories.

℞. Morphiæ Hydrochloratis gr. ⅓
Fiat Suppositor. Mitte tales vj.
Sig. As directed.

It is a good plan to quiet the pain rapidly with the hypodermic injection; and to keep up the good effect by suppository, in ⅓ grain doses every 6 hours, beginning 6 to 8 hours afterwards. See that the patient or attendant understands that the suppositories are to be passed into the empty bowel.

(4.) *To bring down pulse and temperature.*—In early stages tincture of aconite is invaluable.

℞. Tincturæ Aconiti ʒij.
Sig. Six drops are to be put in a wine glass containing six teaspoonfuls of water. Give a teaspoonful every quarter of an hour.

Drop doses of aconite are of great value. They should be given every quarter of an hour until the pulse is reduced and sweating brought on.

If this fail and the temperature keep high, quinine in 15 grain doses should be tried. The salicylate of quinine is a good preparation and is given just as quinine is. When the stomach is irritable the quinine, in 20 grain doses, suspended in an ounce of mucilage, may be given per rectum.

Sometimes the ice-cap is useful.

After the fever has subsided and suppuration is threatened, the strength must be kept up by tonics (such as quinine and iron) and by nutritious food with a judicious amount of stimulant, claret for example.

c. *Local Treatment.*—In the early stages of sthenic nonseptic cases, 8-10 leeches may be applied over the iliac regions.

Ice is not generally used as a local application in this country, and has its disadvantages.

Of greater use are large hot linseed poultices. They should be made very hot, a layer of flannel intervening between them and the skin, and should be covered with a layer or two of cotton. Such a poultice will be effective for 2 or 3 hours. Blisters and turpentine stupes are good, but soon render the skin so sore that after-treatment by poultices is difficult.

The hot vaginal douche (as directed at page 136), with carbolic acid added in septic cases, should on no account be omitted.

Encysted serous collections should, as a general rule, be left to be absorbed. When troublesome from pressure, they may be tapped by Matthieu's aspirator. A clear serous fluid, often coagulable, is then drawn off, so like urine that the almost involuntary first thought is that the operator has tapped the bladder by mistake.

Pus does not form so often in pelvic peritonitis. It may perforate into the rectum or through the posterior fornix. The treatment of suppuration will be best considered under pelvic cellulitis.

B. Treatment of chronic pelvic peritonitis.—When adhesions are extensive, the case is better left alone. When the uterus is retroverted, it may ultimately be replaced by bimanual manipulation. Massage is good in such cases, but its employment will be considered afterwards when we speak of Weir Mitchell's method of treatment by rest and food.

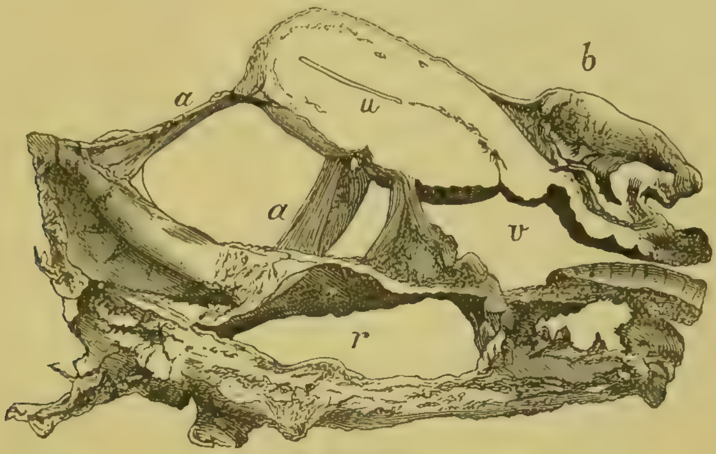


Fig. 119.

Uterus retroverted and bound back by peritonitic adhesions (Winckel). *a a* adhesions; *b* bladder; *v* vagina; *u* uterus; *r* rectum. (½)

PELVIC CELLULITIS.

Synonym.—Parametritis: *Parametritis proper* is a term applied sometimes to inflammation limited to the cellular tissue round the cervix and upper part of vagina, Virchow's parametric tissue.

Nature.—An acute or chronic inflammatory affection, usually septic, affecting the cellular tissue of the pelvis.

PATHOLOGICAL ANATOMY AND VARIETIES.

It is the rare exception to examine a female pelvis without finding some traces of a previous cellulitis or peritonitis. Thus split cervix, so common in women who have borne children, is almost always associated with some cellulitis at the base of the broad ligaments. The uterus is rarely central, but is often drawn to the one side by the cicatrisation of some previous lateral cellulitic inflammation of the broad ligament; the traction may even be so great that it lies at right angles to its proper axis.

We have seen that the utero-sacral ligaments are peritoneal folds containing connective tissue and unstriped muscular fibre. Inflammatory attacks in one or both of these folds (combined pelvic peritonitis and pelvic cellulitis) are very common. Schultze calls this 'parametritis posterior.' The cicatrisation of these ligaments after such inflammation, causing traction just above the isthmus, brings about the most common cause of dysmenorrhœa and sterility—pathological anteflexion of the uterus (*v.* Anteflexion of the Uterus). It is evident that in this way, too, we get the uterus anteflexed and drawn to one side or anteflexed and drawn back (fig. 40).

Sometimes, pelvic abscesses are found in localities to be afterwards alluded to. Often the uterus and ovaries are in an atrophic condition owing to compression of the vessels and nerves by the cellulitic attack ; this quite agrees with the clinical fact that many women with bad pathological anteflexion do not suffer much at their periods, because the withered condition of the organs produces scanty menstruation. Freund has written on a peculiar condition under the term "Parametritis chronica atrophicans"; he asserts that we have a chronic inflammatory condition, ultimately causing atrophy by compression of bloodvessels: perhaps this may be a final stage of cellulitis. According to some, we can have no cellulitis in the broad ligaments and no formation of pus—abscess of the broad ligaments. Clinical, anatomical, and pathological evidence is in favour of the occurrence of both. At the same time, it is almost impossible clinically to distinguish abscess of the broad ligament from an encysted serous pelvic peritonitis behind it, pushing it forwards.

ETIOLOGY.

In *parous women* the great cause of pelvic cellulitis is septic matter absorbed by the lymphatics from the torn perineum, vagina, or cervix. This passes along the abundant lymphatics in the cellular tissue beneath and in the broad ligaments, causing inflammation of the glands and proliferation of the connective tissue in which these are embedded. Thus we find childbirth, premature labour, and abortion, often followed by cellulitic attacks, for obvious reasons. In parturition we have the cervix, for instance, torn vertically at one side ; and septic matter deposited there often speedily spreads along the lymphatic stream. Steurer, who investigated an epidemic of puerperal fever at Strassburg, found such cases with diphtheritic patches about the vulva ; and from these traced bacteria into the connective tissue spaces where their presence gave rise to cellulitis ; from the spaces they entered the lymphatics causing lymphangitis.

Klebs, who terms the bacteria found in a wound "microsporon septicum," traced their penetration, with or without the aid of wandering white-blood corpuscles, from serous membranes into the connective tissue, and noted their penetration through the eroded wall of a vein.

Recklinghausen found the lymphatics of the skin, at the edge of an erysipelatous patch, filled with bacteria.

Still more recently, Koch has investigated the relation of bacteria and micrococci to traumatic infective diseases in his recent monograph translated by Watson Cheyne. It is well worth perusal.

The practical result of all this is that, in gynecological operations and abortions, all wounds must be kept strictly clean; and that Listerism, when possible, should be carried out (*v.* Ovariotomy and Treatment of Pelvic Abscess). The student will, as he proceeds, see endless applications of these results.

In *nulliparæ*, cellulitis may arise from the same causes as are given under pelvic peritonitis, *e.g.*, exposure to cold during menstruation.

Pelvic peritonitis, in a minor degree, is always associated with cellulitis for reasons already given. So far as we have considered the etiology of pelvic inflammatory affections, we have associated them with some virus, most frequently septic. We do not believe that mere traumatic injury, apart from septicity and tension, can cause any inflammatory attack.

SYMPTOMS.

The patient has a rigor or chill. Pain is felt over the lower part of the abdomen, but it is not so intense as in peritonitis. The pulse and temperature are raised. Often after exudation has taken place, the patient has one thigh alone drawn up.

PHYSICAL SIGNS.

There is pain on palpation of the abdomen; and after exudation has taken place, we feel a fulness at one side of the uterus or in the iliac fossa.

Bimanual examination, always difficult, reveals at first nothing but increased heat and tenderness. After exudation has occurred, it is found in the following positions:

(1.) As a bulging at the side of the uterus, depressing the lateral fornix and pushing the uterus usually to the other side;
(2.) in the upper portion of the broad ligament, and therefore not bulging downwards;
(3.) in the iliac fossa;
(4.) very rarely, behind the uterus;
(5.) almost never, between uterus and bladder.

We have seen pus pointing in the inguinal region on one side, and with no dipping down into the pelvis or intermediate connection with the side of the uterus. When pus is present in large amount, the fluctuation can be felt bimanually. When it forms in the centre of a large inflammatory exudation, an obscure boggy feeling may or may not be made out. Aspiration helps here very much.

The course of these exudations, inflammatory and purulent, is explained in two ways.

(*a.*) By the course of the lymphatics, which run, as we have seen, from the uterus outwards beneath and between the layers of the broad ligament to the glands in the lumbar region.

(*b.*) By the lines of cleavage in the cellular tissue of the pelvis. The student should refer back to König's researches (page 44). Based on these, and on clinical work, König asserts that—

(1.) an exudation in the broad ligament, near the tube and ovary, passes first along the psoas and iliacus and then sinks into the true pelvis :

(2.) exudations which begin primarily in the deeper cellular tissue on the antero-lateral aspect of the cervix, pass first on to the cellular tissue of the true pelvis at the side of the uterus and bladder; and then pass with the round ligament to Poupart's ligament beneath the inguinal canal; thence they pass outwards and backwards into the iliac fossa :

(3.) abscesses, developing from the posterior aspect of the broad ligaments, fill first the postero-lateral part of the pelvis and then pass as in (1).

DIFFERENCES AND DIFFERENTIAL DIAGNOSIS BETWEEN PELVIC PERITONITIS AND CELLULITIS.

Differences.

Pelvic Peritonitis.	*Pelvic Cellulitis.*
(1.) Inflammatory affection of pelvic peritoneum chiefly.	(1.) Inflammatory affection of pelvic cellular tissue chiefly.
(2.) Usually general, round the uterus.	(2.) Usually lateral.
(3.) Not always septic.	(3.) Usually septic.

Differential Diagnosis.

(1.) Pain very severe.	(1.) Pain not so severe.
(2.) Patient's legs drawn up on both sides.	(2.) Usually, only one leg drawn up.
(3.) Firm flat effusion not bulging into fornices, and round the	(3.) Firm effusion, bulging usually into fornix of one side. Thus

uterus. Symmetrical bulging of serous effusion behind uterus. Cervix (vaginal portion) is normal length.	cervix (vaginal portion) apparently shortened on one side.
(4.) Does not spread along round ligament or into iliac fossa, but may affect all peritoneum.	(4.) Exudation or pus spreads in definite directions, and is usually localised.
(5.) Uterus displaced to front, or unaltered in position.	(5.) Uterus usually displaced to one side.
(6.) Vomiting more frequent.	(6.) Vomiting less frequent.

It is often very difficult to differentiate these; and therefore in some cases the diagnosis must be pelvic inflammation, probably cellulitic or peritonitic, as the case may be.

COURSE AND RESULTS.

Very often the attack passes off and leaves no trace. The septic poison is too small in amount to do harm; or it sets up some inflammatory exudation, which mechanically arrests progress, and then becomes absorbed. The vitality or health of the tissues and the strength of the poison have also their share in determining its progress. Exudation may take place and may be absorbed almost completely, may suppurate slowly and only to a limited extent, or may form a large abscess. This abscess may open into the bowel or bladder, or pass below Poupart's ligament, or upwards beneath the kidney. Rarely does it appear in the perineum, or pass through the sciatic notch to the buttock. In one case where the last occurred, the patient complained of a very deep seated pain just over the notch.

It is valuable to note how rarely the abscess perforates into the peritoneal cavity. The peritoneal surfaces of the abdominal contents are in contact; and as the inflammatory attack spreads, it sets up a peritonitis, glueing the adjacent surfaces together. When pus does enter the peritoneum, it sets up a rapidly fatal peritonitis.

PROGNOSIS.

This depends on the extent of the inflammatory attack, and its effect on the patient's health. Its septic origin usually causes anxiety; but it does not spread so rapidly as peritonitis. Resolution of inflammatory deposits is slow. Pathological anteflexion gives rise to troublesome dysmenorrhœa and sterility. Prognosis should always be guarded as to complete recovery.

TREATMENT.

The general and the local treatment are exactly the same as in pelvic peritonitis. The occurring of suppuration is indicated by rigors and should be hastened by the hot douche and poultices. We may have only part or parts of the exudation suppurating, so that in a cellulitic swelling we may have inflammatory exudation containing separate abscess cavities. In these, tapping with Matthieu's aspirator is very good, and may be often repeated. Care should be taken that the aspiratory needle has been purified in carbolic lotion (1-20), and prior to introduction dipped in carbolic oil (1-20).

When pus is present in large quantity, the treatment varies according to the part at which it points.

(1.) If it point below Poupart's ligament, in the buttock, or behind the kidney, it is to be opened under Listerism and a drainage tube inserted. Results by this method are admirable.

(2.) If it bulge in the vaginal roof, it should be opened as follows :—Pass Sims' speculum, and open into the cavity with Paquelin's cautery at a dull heat ; make the opening big enough to admit two good sized drainage tubes. Daily irrigate the cavity with weak carbolic lotion (1-100) or boracic lotion (1-30). If the discharge is profuse it may be received into pads of salicylic cotton wool placed over the vulva ; oakum or marine lint may be used among poor people.

The drainage tubes should be double, and with a small piece at the end at right angles which prevents them slipping out. They should not be perforated, as this prevents the washing out. If only straight tubes can be had, a small piece of ivory can be stitched to the upper end.

During suppuration, tonics and nutritious diet should be given.

CHAPTER XVI.

PELVIC HÆMATOCELE.

LITERATURE.

Aitken, Lauchlan—Case of Pelvic Hæmatocele : Ed. Med. J., 1862, p. 104. *Bandl*—Op. cit *Bernutz and Goupil*—Op. cit. *Barnes*—Op. cit. p. 590. *Bourdon*—Tumeurs fluctuants du petit bassin : Rev. Med., 1841. *Credé* -Monatsschrift. f. Geburtskunde, Bd. IX. S. 1. *Duncan, Matthews*—Uterine Hæmatocele : Ed. M. J. 1862, p. 418 : Clinical Lectures, Churchhill, Lond., 1879. *Fritsch*—Die Retro-uterine Hæmatocele : Volkmann's Sammlung No. 56. *Kuhn*—Ueber Blutergüsse in die breiten Mutterbänder und in das den Uterus umgebenden Gewebe : Zurich, 1874. *M'Clintock*—Diseases of Women : 1853. *Nélaton*—Gaz. des Hôpitaux, 1851 and 1852. *Pelletan* –Clinique Chirurgicale, Paris 1810. *Priestley, W. O.*—Pelvic Hæmatocele : Reynolds' System of Med., Vol. V., p. 783. *Simpson, J. Y.*—Peri-uterine or Pelvic Hæmatocele, Collected Works, Vol. III., p. 121 : A. & C. Black, Edinburgh. *Schroeder*—Op. cit. S. 453 : Kritische Untersuchungen über die Diagnose der Hæmatocele Retro-uterina : Arch. f. Gyn. Bd. V. *Tilt* -Pathology and Treatment of Sanguineous Tumours, Lond. 1853. *Voisin*—De l' hématocèle Rétro-utérine : Thése, Paris 1858. The literature is well given in Bandl's work and Priestley's article.

SYNONYMS—Retro-uterine Hæmatocele : Uterine Hæmatocele.

THIS subject will be considered under the same heads as the preceding.

Preliminary Considerations.—The abundant venous supply of the pelvic organs, the congestion induced by menstruation, and the hæmorrhage accompanying the monthly rupture of the Graafian follicle, render women peculiarly liable to hæmorrhages into the pelvic cavity. Yet it is astonishing that it is only since 1850 that this subject has really attracted gynecologists' attention. It was in that year that Nélaton gave the subject due prominence; although Voisin (1810), Recamier, Bourdon (1841), Ollivier, and Bernutz had all recorded cases, under such titles as "Bloodgush from an aneurism of the ovary," "Blood cysts of the pelvic cavity." Nélaton had diagnosed his case as an abscess, and opened it with a bistoury ; the blood and blood clots escaping from the incision showed its real nature unmistakably. Since that time, pelvic hæmatocele has taken its place in gynecology as a serious and important *symptom.*

NATURE.—*An effusion of blood, usually into the pelvic peritoneum, sometimes beneath it; enclosed either by anatomical structures or previously existing inflammatory adhesions.*

Many will consider this definition unsatisfactory; it must be taken, however, in connection with the following remarks. Pelvic hæmatocele is not a disease. It is only a symptom of some previously existing pathological condition of the pelvic organs, just as hæmoptysis is not a disease but usually a symptom of some lung condition. We have limited the term hæmatocele to hæmorrhages into the pelvic cavity.

It is disputed whether the inflammation encysting and limiting the hæmorrhage is antecedent or consequent to it. The former view has much more evidence in its favour, although some cases support the latter. This, however, belongs more especially to pathological anatomy.

It may be urged that we have limited the term pelvic hæmatocele to hæmorrhages enclosed by anatomical relations or inflammatory adhesions. We do this, however, for the following reason. The hæmorrhage gives no physical sign until enclosed, and is no more palpable to the finger examining through the fornices than the intestines or ascitic fluid are. Fluid blood in the pelvis can only be diagnosed by abdominal incision or *post-mortem.*

PATHOLOGICAL ANATOMY.

Post-mortem cases are rare, but enough have been recorded to give us some idea of its pathology.

In almost all the cases, the blood is found enclosed by pelvic inflammatory adhesions, apparently antecedent. Dr Lauchlan Aitken has recorded a case which, during life, presented the usual physical signs of retro-uterine hæmatocele, viz., a retro-uterine tumour bulging into the posterior fornix vaginæ and displacing the uterus markedly forward; and in which, on *post-mortem*, clotted blood, not enclosed by adhesions, was found behind the uterus.

Usually, however, the tumour when retro-uterine has, as its boundaries, the uterus and broad ligaments in front and the sacral peritoneum behind; while, above, it is roofed in, as it were, by adherent intestine or by the retroverted and adherent uterus. The uterus is markedly driven forward by the effusion.

Sometimes the blood is found effused between the layers of the broad ligament, which limits it unless the effusion is so great as to perforate a lamella and escape into the peritoneum. Occasionally the blood is below the peritoneum and dissects it up as it escapes from the vessels; or it is found in the cellular tissue of the pelvis.

It is of the highest pathological importance to note that in a very large proportion of the cases diseased ovaries have been found; changes in the Fallopian tubes (dilatation and filling with blood or pus) being less common.

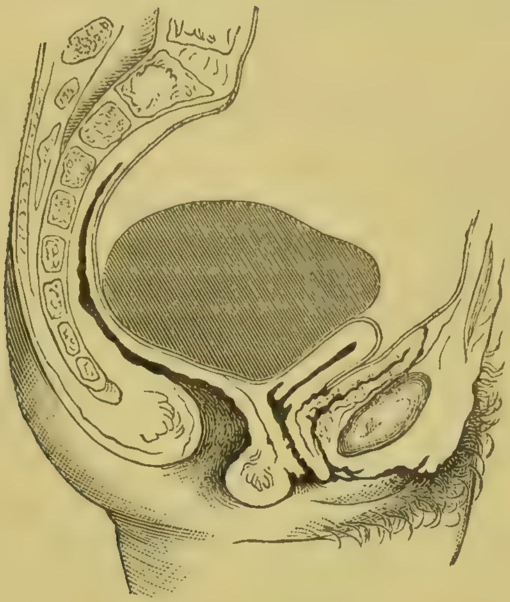


Fig. 120.
Retro-uterine Hæmatocele. Pouch of Douglas previously obliterated by inflammation.

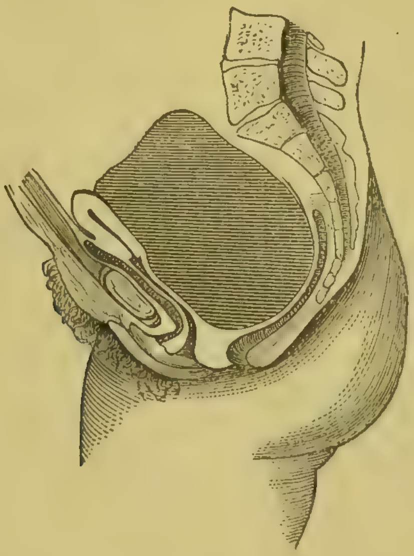


Fig. 121.
Retro-uterine Hæmatocele. Pouch of Douglas not previously obliterated (Schroeder).

The effused blood undergoes changes in course of time, so that blood crystals, granular corpuscles and oil drops are found as traces of the previous blood effusion. When the patient dies soon after the hæmorrhage, the blood is merely clotted. In most cases of recovery it becomes entirely absorbed.

ETIOLOGY : SOURCES OF HÆMORRHAGE AND VARIETIES.

The table quoted below shows that pelvic hæmatocele is most common in women between the ages of 25 and 35, that is, women in their period of full menstrual and sexual vigour. Out of 43 cases, the ages, according to Schroeder, were as follows :—

In 3	cases, or	7·0	p. c.,	the ages were . .	22-25
,, 14	,,	32·5	,,	,, . .	25-30
,, 13	,,	30·2	,,	,, . .	30-35
,, 9	,,	20·9	,,	,, . .	35-40
,, 3	,,	7·0	,,	,, . .	40-43
,, 1	,,	2·2	,,	,, . .	53

It is also most common in Multiparæ, and occurs in about 4 or 5 per cent. of specially female diseases.

The following are the chief causes of hæmorrhage, and its anatomical sources.

1. *Predisposing causes.* Profuse menstruation; violent exercise during menstruation, such as dancing; violent coitus during menstruation; varicose conditions of the subperitoneal veins; purpura; scorbutus; hæmophila.

2. *Anatomical sources.* (*a.*) *Pelvic Peritoneum.* — There may be rupture of veins of the pampiniform plexus, or of the veins below the uterine peritoneum. In the former case, we may get the blood pouring directly into the peritoneum; or first passing between the layers of the broad ligament, and either remaining enclosed there or rupturing into the peritoneum. The hæmorrhage, according to Virchow, may arise from vessels developed in the false membranes of pelvic peritonitis. Crede of Leipzig quotes a case where he tapped a tumour and first got serum, then blood-stained serum, and finally blood. In two days, a fresh tapping first gave putrid blood and then fresh blood in abundance.

(*b.*) *Connective tissue.*—Rupture of veins occurs here also.

(*c.*) *Uterus.*—We may have regurgitation in menorrhagia from the uterus along the dilated Fallopian tubes. Rupture of interstitial extra-uterine pregnancy is another cause of hæmorrhage.

(*d.*) *Fallopian tube.*—Blood may come from its hyperæmic mucous membrane. More usually it arises from rupture of an extra-uterine pregnancy there.

(*e.*) *Ovary.*—Here it results from rupture of congested vessels, of the Graafian follicles, or of extra-uterine pregnancy in Graafian follicles.

Of all these causes, rupture of veins below the peritoneum, and rupture of Fallopian tube and ovarian pregnancies are the most common. The student will now clearly see the *symptomatic nature* of hæmatocele.

Varieties.—We have adopted "pelvic hæmatocele" as a convenient general term. When the blood effusion is retro-uterine and intraperitoneal, then "retro-uterine hæmatocele" is the term usually employed.

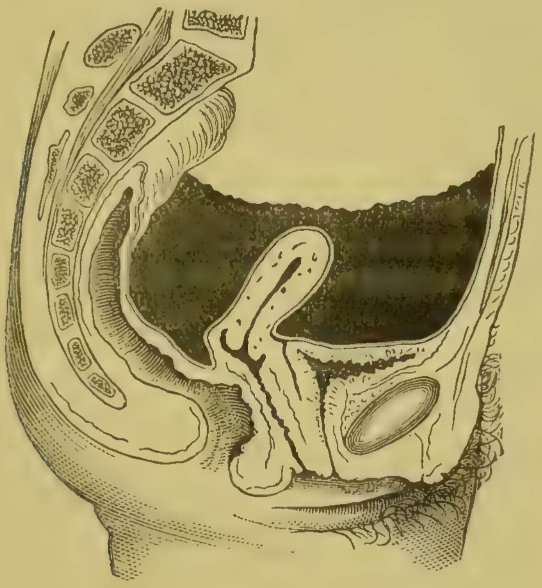


Fig. 122.

Copious blood-effusion ante and retro-uterine.

In cases where the blood effusion is copious, it may flow up to the anterior fornix, "ante-uterine hæmatocele;" when beneath the peritoneum—extra-peritoneal—and extensive, it may be termed "peri-uterine". An effusion into the connective tissue is conveniently termed *hæmatoma.*

All these may be classed under two heads, viz. :—

1. Intra-peritoneal, *i.e.*, blood effusion into the pelvic peritoneum ; the most common class.
2. Extra-peritoneal, *i.e.*, blood effusion beneath the peritoneum, between the layers of the broad ligament or deep in the connective tissue.

SYMPTOMS.

The chief symptoms are menorrhagia, sudden onset, sudden bloodlessness, pain. The pulse may become feeble from anæmia, and the temperature is not above normal. Menorrhagia is not always present, and the bloodlessness may not be very well marked; sometimes patients have a sudden faint feeling. In cases of copious effusion from rupture of an extra-uterine pregnancy, the symptoms are often like those of irritant poisoning, viz., sudden onset, prostration, vomiting. The marked anæmia, however, points to some internal hæmorrhage; inquiry should then be made as to menstruation, and this always followed by bimanual examination.

In retro-uterine hæmatocele, we find frequent painful micturition and difficulty in evacuation of the bowels. There is no retention of urine.

PHYSICAL SIGNS.

These are sometimes negative; oftener characteristic, especially in retro-uterine hæmatocele.

Blood effused into the pelvic peritoneum and neither coagulated nor enclosed by adhesion, is not palpable to examination, and does not cause the pouch of Douglas to bulge downwards (fig. 123). It will be pressed out of the pouch of Douglas, as the bladder distends, and return into it when it empties. It is often said that the effused blood naturally gravitates into the pouch of Douglas. It does not do so. It lies

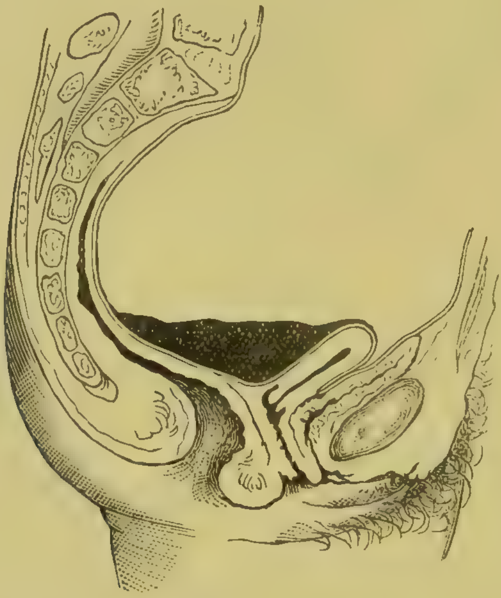


Fig. 123.

Free blood not causing pouch of Douglas to bulge down.

in the pouch of Douglas only *because it has been effused near it;* and it causes the pouch of Douglas to bulge down only *when it is effused below adhesions* which limit its spreading up. Blood has a specific gravity of 1055, and remains where it has been effused. Yet effused blood is often spoken of as if it were lead, sinking down whenever it got out of the bloodvessels.

When, however, blood is poured out near the pouch of Douglas and below adhesions, we get the following characteristic state. On abdominal palpation, a tumour may be felt. On vaginal examination a firm convex bulging tumour is felt, varying in size from a billiard ball to a child's head and sometimes filling up a large part of the pelvic cavity; the os uteri is pressed close behind the symphysis, looks downward and is often almost inaccessible (fig. 121). A good plan to get at it is to turn the index finger palmar surface to the symphysis, and push it well up. *On bimanual examination, the fundus uteri is felt unusually distinct, just below the abdominal walls, just behind the symphysis, and generally to one or other side.* This settles the point that the retro-uterine tumour is not the uterus. The sound confirms the bimanual as to the position of the uterus, but is not as a rule necessary.

When the effusion is into the broad ligament the exact diagnosis is more difficult. Such cases are usually found on post mortem or operation. During life, reliance must be placed on symptoms, viz., sudden occurrence, and absence of inflammation at first. The physical signs in large peri-uterine effusions are that the bulging is round the uterus, and that it is not confined to the pouch of Douglas. *Hæmatoma* is difficult to diagnose, and is probably often mistaken for a cellulitic deposit.

When the blood effusion is large, the patient may sink before any very definite physical signs are found. We have taken the view that pelvic peritonitis is usually antecedent to the hæmatocele. At the same time we always have a resulting peritonitis coming on in a day or two, this being indicated by increased pulse and temperature and by tenderness on pressure.

All that has been given here is only how to diagnose the *symptom* of the occurrence of hæmorrhage. The diagnosis of the condition causing the hæmorrhage is, unless in the case of extra-uterine pregnancy, as yet beyond our clinical knowledge.

DIAGNOSIS AND DIFFERENTIAL DIAGNOSIS.

Pelvic hæmatocele requires to be diagnosed from—

Pelvic peritonitis followed by enclosed serous effusion in pouch of Douglas,
Pelvic cellulitis,
Fibroid on posterior wall of uterus,
Ovarian cyst behind uterus,
Extra-uterine pregnancy,
Retention of blood in horn of maldeveloped uterus,
Retroversion of non-gravid or gravid uterus.

Of these we consider at present only pelvic peritonitis and pelvic cellulitis.

In these two purely inflammatory affections we have the inflammatory symptoms from the first, without a history of sudden onset or of menorrhagia. Further, the difference in etiology of hæmatocele and peritonitis will help us. The history is of the greatest service.

COURSE AND RESULTS.

In many cases ($\frac{4}{5}$ according to Voisin) the blood effused becomes entirely absorbed, in a time varying from 2 to 10 months.

The tumour, with partially clotted or purulent contents, may burst into the rectum, vagina or peritoneal cavity: in the last case, fatal peritonitis follows.

When the blood effusion is very large, death may be rapid.

PROGNOSIS.

As to Life.—This is, as a rule, settled soon. The most fatal cases are extra-uterine pregnancies, and rupture of varicose vein into the peritoneum with no peritonitic adhesions to limit the blood effusion. After peritonitis is set up, the prognosis is much as in pelvic cellulitis.

TREATMENT.

(1.) *At onset of hæmorrhage.*
(2.) *When suppuration occurs.*

(1.) *At onset of hæmorrhage.*—The treatment here is expectant. The patient is to be put at complete rest, with ice bags to the abdomen. Ergotine should be injected into the buttock. If the patient is collapsed, then stimulants and hypodermic injections of sulphuric ether or whisky must be freely used. In most cases, the source of the bleeding is unknown; the present state of knowledge does not enable us to lay down any rule as to the opening of the abdominal cavity and the attempt to ascertain and secure the bleeding source. In Fallopian tube pregnancies which have burst, the abdomen has been incised and the tube ligatured on either side of the rupture; but no case of cure has been reported so far as we know. The plan of incising the retro-uterine tumour and clearing out clots is wrong; it simply leads to more bleeding from rupture of adhesions. When absorption is going on, the treatment is just as in pelvic peritonitis.

(2.) *After suppuration has occurred.*—The tumour is to be opened and drained, as recommended at p. 162 for suppurating pelvic cellulitis.

Recently, Mr Lawson Tait has recommended that some pelvic abscesses be opened by abdominal section, as we often get very tedious cases when they perforate into the bowel. The following was the treatment in one of six cases in which he performed it. "I determined to open it from above. . . . I found a large cavity containing about two pints of fœtid pus with decomposing blood clots. This I carefully cleansed out, and after having united the edges of the opening into the cyst carefully to the abdominal wound, I fixed in one of Kœberle's drainage tubes five inches long. . . . The patient went home cured on the 30th day."

Tait's cases were chiefly suppurating hæmatoceles (Tr. of Lond. Med. Chir. Soc., vol. 62).

SECTION IV.

AFFECTIONS OF THE FALLOPIAN TUBES AND OVARIES.

Chapter XVII. Fallopian Tube : Parovarium : Round Ligament : Broad Ligament : Tubo-ovarian Cysts.
,, XVIII. Malformations of Ovary : Ovaritis and Periovaritis : Displacements of Ovary—Hernia, Prolapsus.
,, XIX. Battey's Operation.
,, XX. Pathology of Ovarian Tumours.
,, XXI. Diagnosis of Ovarian Tumours.
,, XXII. Operative Treatment of Ovarian Tumours.

CHAPTER XVII.

FALLOPIAN TUBE: PAROVARIUM: ROUND LIGAMENT: BROAD LIGAMENT: TUBO-OVARIAN CYSTS.

LITERATURE.

Bandl—Op. cit. *Barnes*—Op. cit. p. 376. *Hennig*—Krankheiten der Eileter und die Tubarschwangerschaft: Stuttgart, 1876. *Duncan*—Clinical Lectures: Lond., 1879. *Klob*—Pathologische Anatomie der weiblichen Sexualorgane: Wien, 1864. *Nœggerath*—The Vesico-vaginal and Vesico-rectal Touch: Am. J. of Obst., VIII., p. 123. *Simpson, J. Y.*—Op. cit. p. 539. *Schroeder*—Op. cit. S. 329. *Tait*—Menstrual Fluid retained in the Left Fallopian Tube simulating Ovarian Tumour: Br. Med. J., 1878, p. 677. *Thomas*—Op. cit. p. 760. *Williams*—Ovarian Tumours: Reynold's System of Medicine, Vol. V. *Wells, T. S.*—Diseases of Ovaries: London, 1873. For other literature see Bandl, whose work and that of Hennig we mainly follow.

FALLOPIAN TUBE.

Preliminary Considerations.—The anatomical relations of the Fallopian tubes have been already considered (p. 20). Functionally, they act as ducts along which the spermatozoids pass to fertilise the ovum; and along which the ovum, fertilised or non-fertilised as the case may be, is carried to the uterine cavity. So far as we know this is all their physiological function, unless we hold with Tait that they play some important though as yet undefined part in menstruation. Pathologically, the Fallopian tubes are important from the occurrence of extra-uterine pregnancy in them and their occasional dilatation with pus or blood. From the fact that they open on the one hand into the uterus, and on the other hand into the peritoneum, very serious results may follow from fluid accumulations in them, from spreading gonorrhœa, or from injections into the uterus.

Can the normal Fallopian tubes be palpated in the bimanual? The student will probably have already noted that, in considering the bimanual (p. 93), we did not name the Fallopian tubes as structures whose form and limits he was expected to define. In a very favourable case, the conjoined manipulation may define them at their uterine origin—more especially if the rectal examination be made and the uterus be well drawn down with the volsella. Noeggerath has pointed out that they may be defined in those cases where the finger is passed along the urethra to explore the interior of the bladder, an operative procedure to be described afterwards. Practically the Fallopian tubes, unless much dilated, are not palpable to ordinary examination.

Catheterisation of the tubes.—In certain undoubted cases the uterine sound has been passed along the Fallopian tube, while in others the supposed sounding of the tube has been really the perforation of the uterine wall. It is impracticable to sound the normal Fallopian tubes to any effect; and the procedure, or rather the attempt, is by no means devoid of danger.

We now take up their pathological conditions under the heads of—

Abnormalities,
Stricture and Occlusion,
Patent condition of the Tubes,
Inflammatory conditions of the Tubes,
Hydrops Tubæ,
Pyosalpinx and Hæmatosalpinx,
New Formations,
Extra-uterine fœtation (to be considered under Section IX).

ABNORMALITIES.

These are of little practical interest. The chief one is an accessory fimbriated end.

STRICTURE OF THE TUBES.

The tube may have a congenital stricture; or may become closed at the uterine or the fimbriated end or in the middle. When stricture occurs at the uterine end, it is caused by implantation of the placenta there or by endometritis with adhesion. In the middle, small tumours or adhesions may cause stricture—in the latter case usually partial. At the fimbriated end, the occlusion is due to a catarrh of the tubes which has spread to the peritoneum and set up adhesive peritonitis.

These strictures are of importance in relation to sterility and fluid accumulations, but cannot be diagnosed during life.

PATENT CONDITION OF THE TUBES.

By this is meant undue dilatability. It is of great importance in relation to uterine injections. Even in careful injection of the uterine cavity, post partum or otherwise, fatal results have followed from the fluid passing along the tube into the peritoneal cavity. "Forcible uterine injections on the cadaver, with the cervix entirely filled up by the syringe, almost always sent fluid along the tubes into the peritoneal cavity. Less forcible injections under like conditions sent the fluid along a less distance (2-3 mm.), and often sent it into the veins; while gentle injections with a tube not filling the cervical canal sent fluid neither into the tubes nor veins." Bandl, from whom the above is taken, records a case where death resulted from injection of an aborting uterus with perchloride of iron, although the injection pipe was less in diameter than the cervix. The death may be immediate from shock, or some days after from peritonitis. In uterine injections no more than 1-4 drops should be used.

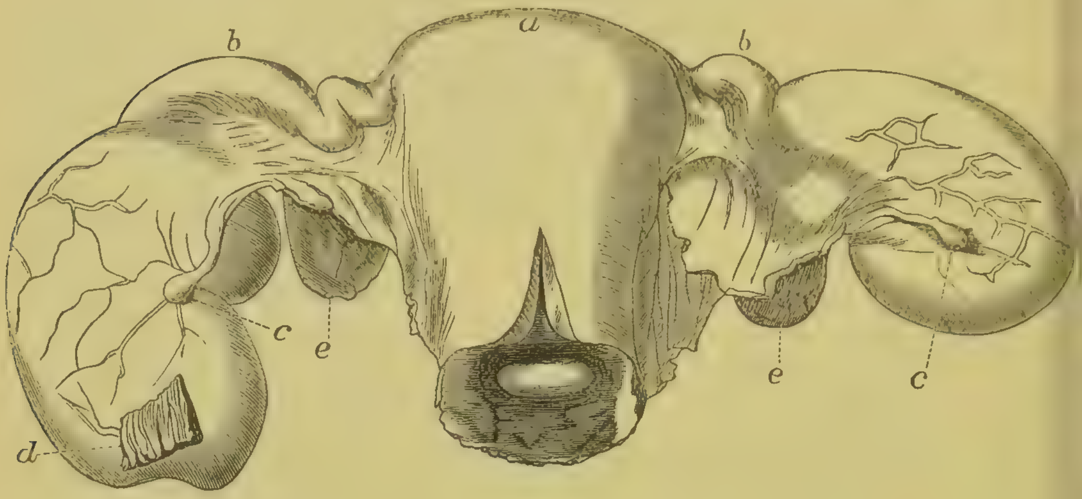


Fig. 124.

Hydrops Tubæ: *a* Uterus with cervix laid open in front; *bb* Fallopian tubes; *cc* hydrops: *d* part of an inflammatory adhesion; *ee* ovaries (Hennig).

INFLAMMATORY CONDITIONS OF THE TUBES, CATARRHAL SALPINGITIS.

The Fallopian tube has three layers—peritoneal, muscular, and mucous. An inflammatory condition of the peritoneum (perisalpingitis) is simply part of ordinary pelvic peritonitis, is not diagnosable, and is not in itself of any importance. The same may be said of mesosalpingitis (inflammation of the muscular coat).

Catarrh of the mucous membrane lining the Fallopian tube (catarrhal salpingitis) is not idiopathic, but is secondary to endometritis.

Pathological Anatomy.—In acute catarrh in adults the tube contains neutral or acid mucus in excess, glandular cells, and ciliated epithelium.

Chronic catarrh is more frequent than acute, and occurs in all degrees from a simple hyperæmia to the formation of pus. The tube is often dilated and may communicate with a cavity in the ovary.

As the condition is not *diagnosable* during life no *treatment* can be indicated.

HYDROPS TUBÆ.

As the result of stricture of the tube and marked catarrh, we get the tube distended with serum (hydrops tubæ) or pus (pyosalpinx).

Pathological Anatomy.—The whole or only a part of the tube is dilated, according to the locality of the stricture (fig. 124). There may be several strictures and thus several cysts. The tube distends and atrophies, so that the mucous membrane becomes thin and the muscular coat disappears. The fluid is usually serum with cholesterine and occasionally blood.

It is alleged that fluid can accumulate in the tube although the uterine end is open; the fluid, at a certain stage of its accumulation, flows into the uterus (profluent dropsy of the tube).

Physical Signs.—An elongated tortuous tube is found at one side of the uterus and high up in the pelvis. Usually a small piece of the undilated tube can be felt between the sac and the uterus.

The *Differential Diagnosis* must be made from the following:—

(1.) Inflammatory conditions or blood extravasation in the broad ligament,
(2.) Fallopian tube pregnancy,
(3.) Small ovarian cyst,
(4.) Parovarian cyst,
(5.) Retention of blood in maldeveloped uterus.

Treatment.—When adhesions are present we should puncture with Matthieu's aspirator through the lateral fornix. When the dilated tubes are free or but partially adherent, they may be removed by abdominal incision as Lawson Tait has recently done.

PYOSALPINX.

This is acute or chronic, and consists in the accumulation of pus in the tubes.

Diagnosis and Treatment is much as in hydrops tubæ. If the tube burst, a fatal peritonitis is set up; adhesions may form and perforation into the vagina or rectum ensue.

HÆMATOSALPINX.

This is a rare condition in which the blood from the congested mucous membrane of the tube is detained there and dilates it. It is often associated with retention of menstrual blood in the uterus (*v.* Atresia Vaginæ). *Diagnosis* is difficult; Bandl records one case where he diagnosed the condition as a fibroid, and Lawson Tait one simulating an ovarian cyst. Rokitansky indeed has said, "Die Gynäkologen erkennen leider diesen Zustand zu spät" (Gynecologists diagnose this condition unfortunately too late).

NEW FORMATIONS.

These we merely enumerate. They are connective tissue growths, lipomata, primary tuberculosis, carcinomata.

PAROVARIUM.

We have already described the rudimentary structure known as the parovarium. Sometimes one or more, usually one, of the tubules becomes distended with fluid. This distention may be very great and constitutes the tumour known as parovarian; its consideration will be best deferred till we treat of Ovarian Tumours.

ROUND LIGAMENT; HYDROCELE.

LITERATURE. *Goodell*—Lessons in Gynecology: Philadelphia, 1880. *Schroeder* -Op. cit. S. 417. *Thomas*—Op. cit. p. 136. *Wile*—Hydrocele in the Female: Am. J. of Obst., July 1881, which see for further literature.

Nature and Pathological Anatomy.—This is a rare malady, and may exist as encysted fluid round the round ligament (extra-peritoneal), or in the canal of Nuck—a process of peritoneum extending from the internal inguinal ring into the labium majus. It may be closed at the internal ring, thus forming a cyst; or it may communicate with the peritoneal cavity.

The fluid is serous in its nature; it may be olive green in colour. The authors have seen three cases—one extra-peritoneal, two intra-peritoneal.

Physical Signs (a.) Of encysted hydrocele of the cord.

An oval translucent swelling exists in the inguinal canal. It cannot be returned into the abdominal cavity, has usually existed for some time, is not tender on pressure, and gives rise to no symptoms. It must be differentiated from an ovary in the inguinal canal, and from incarcerated hernia.

(b.) Of hydrocele in the labium majus.

The labium majus is distended with a fluctuating tumour, dull on percussion and of translucent appearance; usually the contents cannot be returned into the abdominal cavity. Aspiration gives a clear fluid. It is to be diagnosed from hernia in the usual way.

Treatment.—Aspiration and drainage; or aspiration and injection of a few drops of tincture of iodine. Goodell recommends that when the labial form communicates with the abdominal cavity, the internal ring should first be firmly compressed and the injected fluid then sucked out.

BROAD LIGAMENT.

Hæmatocele and inflammatory conditions of the broad ligament have been already considered. We need only further mention that we may have small cysts, fibroids (rare), phleboliths, cancer, and tuberculosis; the last two are only parts of the general peritoneal affection.

TUBO-OVARIAN CYSTS.

These result from adhesions between the fimbriated end of the Fallopian tube and the ovary with degeneration of the corpora lutea of the Graafian follicles thus enclosed. The contents may be poured into the uterus along the tube.

CHAPTER XVIII.

MALFORMATIONS OF OVARY: OVARITIS AND PERIOVARITIS: DISPLACEMENTS OF OVARY—HERNIA, PROLAPSUS.

LITERATURE.

Barnes—Op. cit. p. 297. *Englisch*—Oesterr. Med. Jahrbuch, 1871, p. 335; or, Sydenham Year Book, 1871-72, p. 293. *Freund*—Die Lage und Entwickelung der Beckenorgane: Breslau, 1863. *Herman*—Prolapse of the Ovaries: Med. Times and Gazette, 22nd October 1881. *Klob*—Pathologische Anatomie der weiblichen Sexual Organe: Wien, 1864. *Mundé*—Prolapse of the Ovaries: Am. Gyn. Tr., 1879, p. 164. *Olshausen*—Die Krankheiten der Ovarien: Billroth's Handbuch, Stuttgart. *Schroeder*—Op. cit. S. 341. *Schultze*—Op. cit.

We first take up some preliminary considerations.

Palpation of normal ovaries.—After the student has had practice in the bimanual, he will probably meet with some favourable case where he is able to feel the normal sized ovary. This is best done as Schultze recommends. To map out the right ovary, use the index and middle fingers of the right hand internally and the left hand externally; for the left ovary, the left hand is used internally, and the right externally. The patient should lie on her back, with the knees drawn up and the legs rotated outwards. This rotation of the knees renders the psoas muscles tense, thus making their inner edges (which Schultze gives as a guide to the position of the ovaries) more easily palpable. Normally, they lie at about the level of the pelvic brim, half-way between the Fallopian tube angle of the uterus and the psoas.

Another method of palpating the ovaries is to draw down the uterus with the volsella, and make the examination with the finger per rectum.

MALFORMATIONS OF OVARY.

Absence of one or both ovaries, or rather their very rudimentary development, is generally only part of maldevelopment of the uterus. Occasionally a third ovary is present—a fact worth keeping in mind in relation to Battey's operation (Chap. XIX.).

OVARITIS AND PERIOVARITIS.

Synonyms—Oophoritis: Peri-oophoritis.

Nature.—An acute or chronic inflammation of the ovary.

PATHOLOGICAL ANATOMY.

Acute ovaritis.—In this we recognise two forms occurring in the two subdivisions of ovarian tissue, the follicular or parenchymatous, and the interstitial.

In the *follicular form*, the ovary is not much enlarged; but we find, on microscopical examination, the peripheral follicles increased in size, their contents turbid or purulent, and the cells of the membrana granulosa in a state of cloudy swelling. Usually the surrounding tissue participates, though to a less marked degree, in the inflammatory changes.

In the *interstitial form*, the ovary is increased in size and its connective tissue elements are proliferated. Pus may form, and often there are small apoplexies (Olshausen).

Chronic ovaritis.—As the result of this, we get destruction of the follicles and a cirrhotic condition of the organ. Occasionally the ovary remains distinctly larger. Whether or not we get a super-involution of the uterus as the result of severe and double ovaritis, is not as yet settled.

ETIOLOGY.

The causes of ovaritis are the following:—

1. Gonorrhæa, latent gonorrhæa in the male;
2. Instrumental exploration of the uterus;
3. Childbirth and abortion;
4. Acute febrile diseases;
5. Pelvic peritonitis.

Gonorrhæa.—The ovaries may be inflamed sympathetically, just as the testicles are in gonorrhæa of the male.

Instrumental exploration.—Sometimes after the passage of the uterine sound, especially in difficult cases, the ovary becomes tender.

Childbirth and abortion.—This is a common cause of ovaritis. Thus, in 27 septic cases at Halle, Olshausen found the ovaries affected in 13. Usually both ovaries are implicated.

Acute febrile diseases.—Cholera, the exanthemata, septicœmia, phosphorus and arsenic poisoning, have ovaritis as one of their results.

Pelvic peritonitis.—It will readily be understood that ovaritis often occurs as part of general pelvic peritonitis.

The follicular form usually occurs in febrile diseases and pelvic peritonitis; the interstitial form is generally puerperal.

SYMPTOMS AND PHYSICAL SIGNS.

Acute ovaritis.—A case of simple acute ovaritis is not common. The patient usually complains of pain at the side radiating to the back, and of pain on pressure in the iliac fossæ.

When the bimanual is made, the ovary or ovaries are more accessible and are felt as mobile, tender, and somewhat enlarged bodies, often about the size of a walnut; and pressure causes great pain of a sickening character. Owing to adhesions, the mobility may be wanting. The uterus is felt distinct from them.

Chronic ovaritis.—The symptoms and physical signs are just as in the acute form, but much less marked and with a chronic history. Menorrhagia is often present. Sympathetic pain is sometimes felt below the left mamma.

DIFFERENTIAL DIAGNOSIS.

When the ovary is not fixed, there is nothing else with which it can be confounded.

PROGRESS AND RESULTS.

We may have resolution of the affection, adhesion, suppuration, and abscess. Sterility is a frequent result of double ovaritis; hysteria is often present.

TREATMENT.

Acute ovaritis.—A fly blister should be applied over the appropriate iliac region, and the hot vaginal douche frequently used. Bromide of potassium may be given as follows:—

℞. Potassii Bromidi gr. xxx to ʒi.
Fiat pulv: tales xii.
Sig. One powder at night.

Chronic ovaritis.—The hot douche and occasional blisters are best. The glycerine plug is of value.

A glycerine plug is made as follows. Take a square piece of absorbent cotton wool about the size of the palm of the hand; pour on its centre about ℥ss. glycerine; turn the corners over and squeeze the whole so as to saturate it; lastly, tie a piece of thread about 8 inches long round it. Pass Sims' or Fergusson's speculum and place the plug in the fornix below the ovary. It should be left in for 18 to 24 hours, and then withdrawn.

This plug reduces congestion, owing to the affinity of glycerine for water ; has an antiseptic action ; and as we shall afterwards see, forms an admirable pessary. It sets up a watery discharge so that the patient should be told to wear a diaper on account of this.

The following mixture is of use.

℞. Potassii Bromidi
Potassii Iodidi *aa* ʒij.
Inf. Gentian. ℥vi.
Sig. Tablespoonful thrice daily.

PERIOVARITIS.

By this we understand an inflammatory affection of the tissues surrounding the ovary, which fixes the organ. It is a convenient clinical term for local peritonitic inflammations in the site of one of the ovaries. It is higher up than the usual cellulitic deposit. Its treatment is just as in chronic ovaritis.

DISPLACEMENTS OF THE OVARY—HERNIA.

The term *Hernia* is limited to those cases where the ovaries are present in the inguinal canals, in the obturator foramen (rare), or as part of an abdominal hernia. Percival Pott's case, where this first condition existed and where he excised both of the displaced organs, is the classical instance of this displacement. The usual form is where they are present in the inguinal canal.

ETIOLOGY.

Ovaries in the inguinal canal are usually congenital, having descended along the unobliterated process of peritoneum. In 17 out of 23 cases, Englisch found it to be congenital; and in one third of these, the hernia was double.

DIAGNOSIS AND DIFFERENTIAL DIAGNOSIS.

An oval tumour of the size of the ovary, tender on pressure, is found in the inguinal canal. Its connection with the uterus may be demonstrated by drawing the latter down with a volsella.

It requires to be diagnosed from an ordinary hernia, and from hydrocele of the round ligament.

TREATMENT.

A protecting shield may be worn ; and where very troublesome, the ovaries may be cut down upon and removed. Reduction is usually impossible, owing to adhesions.

PROLAPSUS.

We have already considered the support of the ovary. Its attachments to the broad ligament, to its own special ovarian ligament, and to the ovarian fimbria of the Fallopian tube, support it directly. The infundibulo-pelvic ligament of the Fallopian tube does so indirectly; and, in addition, its own specific gravity has an influence in determining its level. The ovary has its position constantly changing. As the bladder fills, it is displaced backwards; and during pregnancy, it is drawn upwards out of its pelvic position and somewhat enlarged. The ovary is thus an organ liable to displacement, of which the most important is the downward one—known as *prolapsus of the ovary.*

PATHOLOGICAL ANATOMY.

The ovary may lie lower than usual, in the lateral or in the true pouch of Douglas; the uterus may be in its normal position, but oftener it is retroverted. The ovary is usually enlarged and often fixed by peritonitic adhesions.

Mundé considers the varieties of prolapsus as—

(1.) Retro-lateral, in the lateral pouch of Douglas;
(2.) Retro-uterine, in the true pouch of Douglas;
(3.) Ante-uterine, in the anterior fornix, very rare;
(4.) In the infundibulum of an inverted uterus. The authors have seen this last in a case under Professor Simpson's charge.

ETIOLOGY.

The conditions present in the puerperium favour displacement of the ovary for two reasons; the normal ascent of the uterus during pregnancy may stretch the ovarian ligament, and the ovary may not return to its normal size after parturition. Simple congestion of the organ may cause it to descend; and it is alleged that sudden jolts may also drive it below its normal site. It is not quite certain whether the congestion is cause or result. Probably it is the cause; but it is also aggravated by the displacement.

SYMPTOMS.

These are radiating pains, pain on defæcation and coitus, a dragging sensation, reflex nervous symptoms with general irritability.

PHYSICAL SIGNS.

Bimanually, we feel in the true or in the lateral pouch of Douglas a small body or bodies, exquisitely tender and lying distinct from the uterus. By the rectal examination, the ovary is felt with unusual distinctness.

TREATMENT.

Blisters over the iliac region, hot vaginal douche, and bromide of potassium in fifteen grain doses thrice daily. The bowels are to be opened by means of saline purgatives, such as the Friedrichshall water or Carlsbad salts. The following mixture is good.

℞. Magnesiæ Sulphatis	ʒvj.
Quiniæ Sulphatis	gr. xxiv.
Acidi Sulph. dil.	ʒiij.
Tincturæ Capsici	ʒj.
Aquam ad	℥vj.

Sig. Tablespoonful thrice daily.

This relieves the congestion by unloading the bowels.

Often the prolapsed and non-fixed organ becomes, after a week of this treatment, distinctly higher in position. The glycerine plug is then of the utmost value.

In the chronic stage, when the uterus is retroverted and not fixed, the ring or the Albert Smith pessary is good (*v.* retroversion of uterus).

The cases where the tender ovaries are fixed low down by adhesions are exceedingly difficult to treat. When the uterus is retroverted and fixed and the ovaries below it, we get one of the most troublesome cases possible. Palliative treatment by blisters and the hot douche is best; if the case is not amenable to this treatment and the patient's general

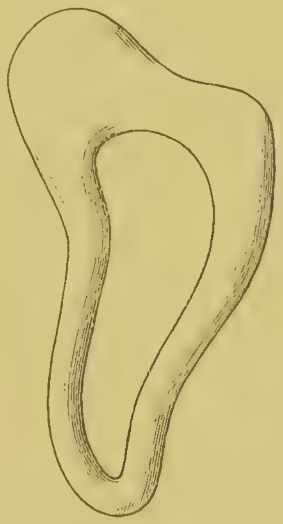


Fig. 125.

Mundé's pessary for prolapsed ovary. The cut away corner lies below the prolapsed ovary.

health is suffering, the propriety of Battey's operation should be considered.

Prolapse of the ovaries and their fixation are contra-indications to treatment indicated otherwise—such as Sims' division of the cervix and Emmet's operation.

In some cases of chronic unilateral prolapse, Mundé has found the pessary shewn at fig. 125 of value. It indicates the kind of variation of the form of the instrument required in different cases—as, for example, in double prolapsus or prolapsed ovary lying just behind the cervix.

CHAPTER XIX.

BATTEY'S OPERATION.

LITERATURE.

The literature on this operation is too extensive to be given in detail in a student's manual. The best summaries of cases are by Engelmann, Hegar, and Simpson. *Battey*—Battey's Operation: Transactions of International Medical Congress, Lond., 1881. See Am. J. of Obst., October 1881, for discussion. *Engelmann*—The Difficulties and Dangers of Battey's Operation: Am. Med. Asso. Trans., 1878 (date of reprint); also, Battey's Operation, 3 fatal cases: Am. J. of Obst., July 1878. *Hegar*—Die Castration der Frauen, Volkmann's Sammlung, Nos. 136-138. *Simpson, A. Russell*—History of a Case of Double Oophorectomy, or Battey's Operation: Br. Med. J., May 24th 1879. *Sims' J. Marion*—Remarks on Battey's Operation: Br. Med. Journal, 1877. For additional literature see American Gynec. Trans., 1879.

HISTORY OF OPERATION.

THE real history dates from August 17th, 1872, when Dr Battey of Rome, Georgia, U.S.A., successfully removed the ovaries of a patient who suffered from intolerable dysmenorrhœa. On July 27th of the same year, Hegar of Freiburg removed both ovaries in a case of severe ovarian neuralgia: the patient died and Hegar did not publish an account of the case. Blundell of London (1823), with that rare medical insight and experimental knowledge which led him to advocate —if not to practise—what recent obstetric science has shown to be the safest mode of performing the Cæsarean Section, had already thrown out the suggestion that the ovaries should be removed in dysmenorrhœa and to arrest hæmorrhage in inverted uterus. To Battey, however, is due the honour of independently conceiving the idea, and—what was more difficult—of successfully carrying it into execution and impressing the profession with its importance and value in special cases.

NOMENCLATURE.

We have adopted the term Battey's Operation, first proposed by Marion Sims, as a convenient and useful one. Other terms, however, have been proposed. The name "Normal Ovariotomy" is a misnomer, inasmuch as the ovaries are not normal. "Spaying," a term advocated by Goodell, does not recommend itself by its delicacy. "Die Castration der Frauen," the German name for the operation, is open to a similar objection.

NATURE AND AIMS OF OPERATION.

Battey's operation consists in the removal of both ovaries which, although diseased, are not appreciably enlarged. Battey proposed it for dysmenorrhœa, on the theory that it would bring on the menopause prematurely. This, however, does not occur as an immediate result. More recently, Battey has declared that he operates to arrest ovulation.

INDICATIONS FOR OPERATION AND ITS RESULTS.

These are not as yet strictly determined; *i.e.*, so far as our present knowledge goes, the operation is indicated in certain conditions but as yet we do not know whether in all of them it produces the anticipated effect. They are as follows :—

(1.) Intolerable Dysmenorrhœa;
(2.) Bleeding from Fibroid Tumours, uncontrollable by other means;
(3.) Hystero-epilepsy, convulsions and threatened insanity, dependent on ovarian irritation or presence of ovaries with absence of uterus;
(4.) Hydroperitoneum;
(5.) Prolapsed and fixed ovaries.

(1.) *Dysmenorrhœa.*—In those cases where the patient has intolerable and prolonged pain every month, wearing her down and rendering habitual recourse to opiates necessary, the operation may be performed. It should not be forgotten that the results in such cases are not so brilliant as was once expected. The menstruation is not at first entirely arrested by the removal of the ovaries; and, as we have always in such cases pelvic peritonitis adding to the patient's misery and untouched by the operation, it is evident that we must not expect too much from it. Lawson Tait believes that the Fallopian tubes must also be removed; but on this point our information is scanty.

(2.) *Bleeding from fibroid tumours, uncontrollable by other means.*—It is in this condition, for which Battey's operation was first advocated by Trenholm and Hegar, that the most brilliant successes have been won. Not only has hæmorrhage been checked, but the tumours themselves have diminished in size and even in some cases disappeared.

(3.) In some cases of *hystero-epilepsy, convulsions, insanity and dancing mania,* dependent on ovarian irritation, the operation has been performed with but moderate success. Engelmann, Gilmore, Russell Simpson, and Battey quote some remarkable cases.

(4.) *Hydroperitoneum.*—Granvill Bantock of London has recently recorded a case where removal of both ovaries cured the hydroperitoneum.

(5.) In cases of *ovaries prolapsed or fixed by adhesions* and giving rise to intolerable pain in coitus or seriously affecting the patient's health, their removal is called for.

At the London International Congress the operation was discussed. According to Battey, the mortality has been 22 per cent. for incomplete operations and 9½ per cent. for complete ; in the other cases, the results as to relief have been—

	No.	Per Cent.
Cured, ...	68	75
Greatly benefitted, . . .	15	17
Not benefitted, . . .	7	8

Of the incomplete operations—

	No.	Per Cent.
Cured, ...	3	18
Greatly benefitted, . . .	7	41
Not benefitted, . . .	7	41

The operators who have operated most extensively have been Lawson Tait of Birmingham who has excised the ovaries in 70 cases, and Savage of Birmingham who has done it in 30 cases.

Tait tabulates his cases as follows.

Cases operated on for pains—

	No. of Cases.	Incomplete Operations.	Deaths.
Recurrent Hæmatocele, .	1	1	0
Abscess of Ovary, . .	2	0	0
Hydrosalpinx, . .	2	0	0
Pyosalpinx, . .	8	0	0
Chronic Ovaritis, . .	8	2	1
Cirrhosis of Ovaries, .	11	1	0
	32	4	1

Cases operated on for Hæmorrhage—

	No. of Cases.	Incomplete Operations.	Deaths.
Hydrosalpinx, . .	1	0	0
Chronic Ovaritis, . .	2	0	0
Small Cystic Ovaries, .	5	0	0
Myoma, . . .	26	1	5
	34	1	5

Cases operated on for Reflex Symptoms—

	No. of Cases.	Incomplete Operations.	Deaths.
Menstrual Epilepsy, .	3	0	0
Deformity, . .	1	0	0
	4	0	0
Total number of cases,	70	5	6

METHOD OF PERFORMING THE OPERATION.

The ovaries may be removed (1.) *by the vaginal method*, or (2.) *by abdominal section*. As the former is the less usual method, we shall describe it but shortly.

(1.) *The vaginal method.* Give chloroform. Place the patient semi-prone or, better, in the lithotomy posture. Pass Battey's speculum, lay hold of cervix uteri with a volsella and draw it down. Wash out the vagina thoroughly with the douche.

Now incise the posterior vaginal wall, behind the cervix, in the middle line for about an inch and a half. Open into the peritoneal cavity, pass in the index finger or long polypus forceps and hook down the nearer ovary; supra-pubic pressure is made by an assistant. Ligature the ovary at the hilus with thin carbolized silk threaded on a fixed needle. The hilus is transfixed mesially with the needle, the double ligature drawn through and cut, one thread is tied round the one half of the base and the other round the other half; the ovary is then cut off and the ligature cut short. The other ovary is treated in the same way; we make certain that there is not a third ovary which would likewise require to be ligatured. Battey passes a temporary ligature round the base of the ovary and then uses the ecraseur. Lastly, pass in a drainage tube, stitch the wound (Battey leaves it unstitched), and irrigate twice daily with weak carbolic solution (1-100). After-treatment as in ovariotomy (*v.* Chap. XXII.).

This method is good when the ovaries are low down. It is sometimes difficult to make out the ovary, and even impossible to remove it. In one case Battey had to dig out portions with his finger nail; all was not removed and the patient conceived some time afterwards.

(2.) *Abdominal section.* The instruments needed are the following:—

Spray;
Carbolic lotion;
Sponges (a definite number);

Ordinary knives ;
Probe-pointed bistoury ;
Spatulæ ;
Dissecting and dressing forceps ;
Tenacula, blunt hooks ;
Pean's artery forceps, a definite number (20) of pairs ;
Needles on fixed handles ;
Catgut for bleeding vessels ;
Long straight needles, threaded two on each suture of silk worm gut ;
Needle holder with small needles on horse hair sutures ;
Thin carbolised silk for ligaturing ovary ;
Drainage-tubes (glass) ;
Carbolic gauze, mackintosh, and flannel bandages.

The spray should be placed eight or nine feet from the patient. It is at present an open question whether the spray should play on the wound or merely into the air of the room. The instruments to be used are placed in a porcelain tray containing carbolic acid 1-40. The sponges are wrung out in 1-60 solution ; when the peritoneal cavity is opened, the solution (1-60) used for the sponges must be *warm.*

The patient is placed in the dorsal posture and chloroformed ; the skin is shaved clean, and washed with turpentine and soap and then with 1-20 carbolic lotion.

An incision, four inches long and ending a little above the mons veneris, is made in the middle line. The knife passes in succession through the following structures—skin, fat, linea alba, fascia transversalis and peritoneum. Bleeding is to be arrested by Pean's forceps left on for a time, or by catgut ligature.

Great care must be taken to recognise the *peritoneum.* It should be lifted up with a tenaculum and an opening cautiously made with a knife or scissors. Remember that the small intestines lie just behind and may be easily cut into. This accident, indeed, has occurred to such a distinguished operator as Spencer Wells ; when it occurs, the aperture should be stitched up with fine catgut. When once an opening has been made through the peritoneum, it can be readily enlarged to the size of the original incision by means of a probe-pointed bistoury guided on the finger.

The fingers are now passed in, the fundus uteri is touched ; and then the fingers, carried along the Fallopian tube, will recognise the ovary usually lying behind it. It should be lifted up if possible to the incision, and ligatured with thin carbolised silk as described under the vaginal method ; the ligatures are cut short and each side of the pedicle held with Pean's forceps. (Marion Sims recommends his uterine repositor as an aid to the elevation of the ovaries. This elevation, however, can be more easily managed by introducing the two fingers or whole hand into the vagina, and elevating all in front of the posterior vaginal wall.)

The ovary is then cut away with the knife at a point about half an inch clear of the ligature. The other ovary is treated in the same way. We hold the pedicle for a time in the Pean's forceps, before dropping it back, to see that there is no bleeding. The peritoneal cavity is now to be thoroughly and carefully cleaned with sponges well wrung out of the warm carbolic solution (*vide* Chapter XXII).

The abdominal incision is now closed ; to prevent blood from passing down while this is being done, a large flat sponge, also well wrung out, is placed in the peritoneal cavity just below the incision. Silk worm gut is most suitable for the deep sutures in the abdominal incision. Straight needles are threaded one at each end of the silk worm gut suture ; the needles are passed, first the one and then the other, from the peritoneal aspect towards the skin. All the sutures are passed before any one of them is ligatured, and the ends drawn together to judge if there be sufficient to close the wound. The sponge placed below the incision is now removed before the sutures are tied. *All the sponges and forceps must now be counted.* Superficial stitches of horse hair are passed to adapt the edges of the skin between the deep sutures. If the operation has been an easy one, no drainage is needed.

The whole operation is by no means an easy one. The skin incision is more difficult than in ovariotomy, for there is always a risk of wounding intestine. In some cases, Hegar has made a lateral incision. Sometimes, especially in cases of fibroids, it is exceedingly difficult to get at the ovaries. Engelmann has more particularly directed attention to this point. In one of his cases he says :—" The ovaries were so deeply imbedded within the folds of the broad ligament, and with them so firmly tied down to the sides and floor of the pelvis that it was impossible to move them. With the greatest difficulty several unsatisfactory ligatures were placed about the left ovary ; but it was useless even to attempt to tie the right, so intimately was it blended with the broad ligament, and so immovably adherent to the pelvic walls. . . . I enlarged the incision to two inches above the navel, removed the intestine from the pelvic cavity and then succeeded in enclosing the entire mass in the ligature, and removing the ovaries complete." Kaltenbach in one case ruptured the Fallopian tube dilated with pus ; the patient died of septic peritonitis. Freund, Martin, Sims and Battey have also recorded difficult cases.

GENERAL CONCLUSIONS.

This operation is as yet on its trial. Gynecologists have not yet settled the exact indications for it, nor the question as to whether it is always worth the risk.

The mortality is high; up to 1879 it was 37·1 per cent (A. R. Simpson).

Part of this is, of course, due to the worn out state of many of the cases operated on and to the extensive adhesions present. Probably the mortality will diminish, although it must be kept in mind that operators have had the benefit of the previous advice and experience of ovariotomists as to its results. We have already seen that its most brilliant successes have been got in fibroids; its success in other cases has been moderate. When many adhesions exist, it is probably better not to attempt it.

Some interesting physiological points have been brought out by it; removal of the ovaries does not bring on the menopause, sexual appetite is not diminished, and no womanly attributes are in any way removed. The outcry that it unsexes a woman is absurd. The ovaries removed were probably useless for procreation; and when their presence is causing *serious* bodily illness, they are better removed.

CHAPTER XX.

PATHOLOGY OF OVARIAN TUMOURS.

LITERATURE.

Barnes—Op. cit. p. 322. *De Sinéty*—(*v.* Malassez). *Doran*—(*v.* Harris). *Drysdale*—On the Ovarian Cell found in Ovarian fluid : Trans. Americ. Med. Ass. (1873, date of reprint). *Foulis*—Cancer of the Ovary : Ed. Med. Jour., 1875, p. 838. The Diagnosis of Malignant Ovarian Tumours, and Malignant Peritonitis : Brit. Med. Jour., 1878, pp. 91 and 658. *Fox, Wilson*—On the Origin, Structure, and Mode of Development of the Cystic Tumours of the Ovary : Med. Chir. Tr., Vol. XLVII., p. 227. *Harris and Doran*—The Ovary in Incipient Cystic Disease : Jour. of Anat. and Physiol., Vol. XV., Pt. IV., July 1881. *Malassez et De Sinéty*—Sur la Structure, l'Origine et le Developement des Kystes de l'Ovaire : Archiv. de Physiologie Normale et Pathologique, Vol. V., 1878, p. 343. *Nœggerath*—The Diseases of Bloodvessels of the Ovary in Relation to the Genesis of Ovarian Cysts : Am. Jour. of Obst., Vol. XIII., 1880. *Olshausen*—Op. cit. *Patenko*—Ueber die Entwickelung der Corpora Fibrosa in Ovarien : Virchow's Archiv., Bd. 84., 1881. *Rindfleisch*—Pathological Histology, New Sydenham Society Translation, 1873, p. 171. *Schrœder*—Op. cit. S. 355. *Slavjansky*—Zur normalen und pathologischen Histologie des Graaf'schen Bläschens des Menschen : Virchow's Archiv., Bd. 51, 1870. *Waldeyer*—Die Eierstockscystome : Archiv. f. Gynäk., Bd. 1, S. 252. *Wells, T. S.*—Diseases of the Ovaries : Churchill, London, 1872. *Williams*—Ovarian Tumours : Reynold's System of Medicine, Vol. V. Olshausen, Schrœder and Williams give the literature well. They should be consulted for full references if necessary.

Under this head we take up—

1. *The mode of origin of ovarian cysts :*
2. *Varieties of ovarian tumours ; their naked-eye and microscopic anatomy :*
3. *The nature of ovarian fluids and of Parovarian fluid :*
4. *Solid ovarian tumours ; malignant tumours and the nature of the ascitic fluid associated with them.*

THE MODE OF ORIGIN OF OVARIAN CYSTS.

Our knowledge of the pathological anatomy of the ovary depends on our information as to its development, its anatomical structure, and the physiological changes it undergoes. On each of these we must make some preliminary remarks.

(1.) As to its *development*. We have already seen that the actively growing connective tissue of the ovary encloses the germ epithelium; that certain of the germ epithelial cells thus enclosed develope into ova; while the connective tissue itself, according to Foulis, forms the membrana granulosa (*v.* Plate VII., fig. F.). The germ epithelium thus *enclosed* gave rise to the idea that the developing ovary was a tubular organ; and to the epithelium thus enclosed (or rather, according to Pflüger, the epithelium *penetrating* into the ovarian stroma) was given the name of Pflüger's ducts.

A section of a developed ovary shows cellular structures, which (according to Waldeyer) are some of Pflüger's ducts that have not developed as they should have done into Graafian follicles. Waldeyer, therefore, regards *Pflüger's ducts* as seats of origin of ovarian cysts (fig. 126).

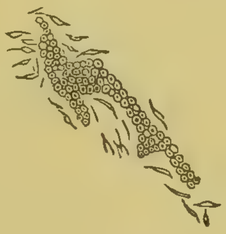


Fig. 126.

Cellular bodies alleged by Waldeyer to be enclosed germ epithelium which has not developed into normal Graafian follicles. He believes these to be one source of ovarian tumours (Nœggerath).

(2.) *The peculiarities of the anatomical structure* are due to the Graafian follicles and certain cellular structures whose exact nature is as yet debated. Of the 30,000 Graafian follicles contained in each ovary, only an insignificant number develope and rupture at each menstrual period. Many of the rest atrophy, forming the corpora fibrosa which are seen on section as fibrous points and contain no vessels; it is alleged that these corpora fibrosa may originate also from ripe follicles or from follicles where there has been hæmorrhage.

The vessels around the follicles sometimes degenerate. The cellular structures shown at fig. 127 are, according to Nœggerath, *diseased bloodvessels.*

(3.) *Its physiology.*—When we consider that at each menstrual period a Graafian follicle distends and then ruptures, we are led to expect what really does sometimes occur, viz., that the follicle may not rupture but merely distend to form a pathological cyst. When pregnancy occurs, the ruptured follicle has its large corpus luteum filling it; and in this also we may have pathological development.

From these preliminary considerations we see that the alleged sources for the origin of ovarian cysts are the following :—

(*a.*) Distention and coalescence of Graafian follicles ;
(*b.*) Degeneration of true corpora lutea ;
(*c.*) Degeneration of undeveloped Graafian follicles, colloid degeneration of the ovarian stroma ;

(*d.*) Degeneration of bloodvessels ;
(*e.*) Pathological development of enclosed germ epithelium, so-called Pflüger's ducts ;
(*f.*) Certain epithelial tubes running into the ovary ;

(*g.*) Malignant development of connective tissue of ovary.

The student should clearly note that these are the *theoretical* sources of ovarian cystic development but that (as we shall presently see) some are disputed.

(*a.*) *Distention and coalescence of Graafian follicles.*—There can be no doubt that small cysts may so originate. The proof of this is positive, as Rokitansky found ova in cysts about the size of a bean. Wilson Fox has attempted to show, in his well-known paper, that all the varieties of cystic tumours may be formed in this way.

(*b.*) *Degeneration of true corpora lutea.*—This has been noted in some cases.

(*c.*) *Degeneration of undeveloped Graafian follicles.*—This is probably an important source. (For details see Harris and Doran's article, and also Slavjansky's and Patenko's papers for normal and abnormal involution.)

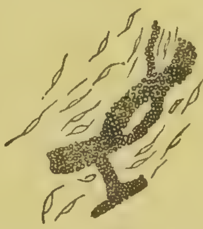


Fig. 127.

Cellular bodies which Nœggerath believes to be diseased bloodvessels and not germ epithelium as Waldeyer asserts (Nœggerath).

(*d. e.* and *f.*) *Degeneration of bloodvessels ; degeneration of Pflüger's ducts ; epithelial tubes running into the ovary.*—Nœggerath of New York first pointed out that *diseased bloodvessels* might form a source of ovarian cysts ; and, more recently, Harris and Doran have confirmed his views. According to Nœggerath, we have disease of the intima of the vessel, loss of its endothelium, and percolation of the contents of the vessel into the intima. Migrating cells accumulate in the interstices of the intima and break it up. The large granular nucleated cells found in ovarian cysts are, according to him, these lymph corpuscles. Nœggerath considers that the cellular structures, which other observers hold to be Pflüger's ducts, are diseased vessels.

Waldeyer considers that ovarian tumours are developed from the processes of epithelium known as *Pflüger's ducts;* they arise, therefore, from the same source as the Graafian follicles.

De Sinéty and Malassez first described certain *epithelial tubes* from which ovarian tumours develope; these are not true Pflüger's ducts, but differ from them in being hollow and having no ovum. They consider them as Pflüger's ducts which have taken on a low type of development (fig. 128).

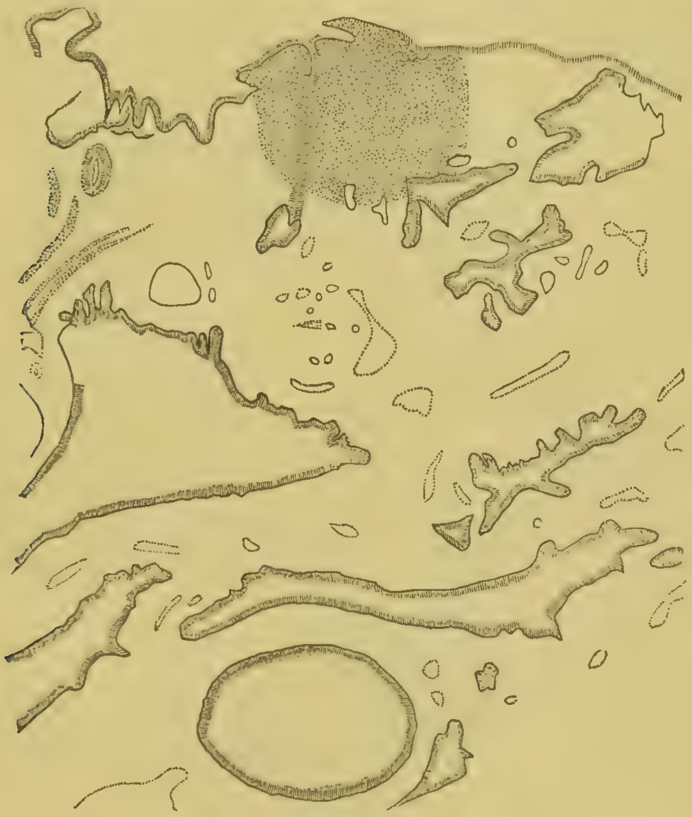


Fig. 128.

Section of ovary showing an epithelial tube (at the shaded part of the section). Lower down are seen spaces of varying size, and lined with a single layer of epithelium; these cysts are developed from the epithelial tubes. The connective tissue basis is shown only at the shaded part of section (De Sinéty).

The student will therefore see that the cellular structures found on section of ovaries, although considered by all as a source of origin for ovarian cysts, have their nature disputed. Nœggerath believes them to be diseased bloodvessels; Waldeyer, Spiegelberg, Schrœder consider them to be Pflüger's ducts ; De Sinéty and Malassez hold that they are Pflüger's ducts degraded in development.

(*g.*) *Malignant development of connective tissue of ovary.*—In malignant disease of the ovary ascitic fluid is often formed in which are characteristic cells, first described by Dr J. Foulis of Edinburgh. Plates VI. and VII. show these. They will be considered under the ascitic fluid associated with malignant tumours. Foulis' developmental work on the ovary has valuable bearings on its pathology.

At present more light is needed in ovarian pathology, as can readily be seen from the heterogeneous facts as yet at our disposal.

VARIETIES OF OVARIAN TUMOURS ; THEIR NAKED-EYE AND MICROSCOPIC ANATOMY.

(1.) Hydrops folliculorum :

(2.) Cystoma ovarii—

- *a.* Cystoma ovarii proliferum glandulare ;
- *b.* Cystoma ovarii proliferum papillare :

  This is Waldeyer's classification. Rindfleisch speaks of a papillary form, a form caused by colloid degeneration of the ovarian stroma (figs. 129, 130), and a form with cysto-colloid degeneration.

(3.) Dermoid cysts :

(4.) Cystoma malignum.

Naked-eye anatomy.—We have the cysts and their pedicle. The cysts are always multiple ; and the pedicle is usually made up of ovarian ligament, Fallopian tube, and broad ligament. Both cysts and pedicle are covered with peritoneum. On section of the cystoid tumour many cysts are found with papillary projections and inter-communications.

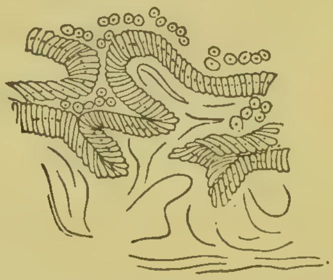
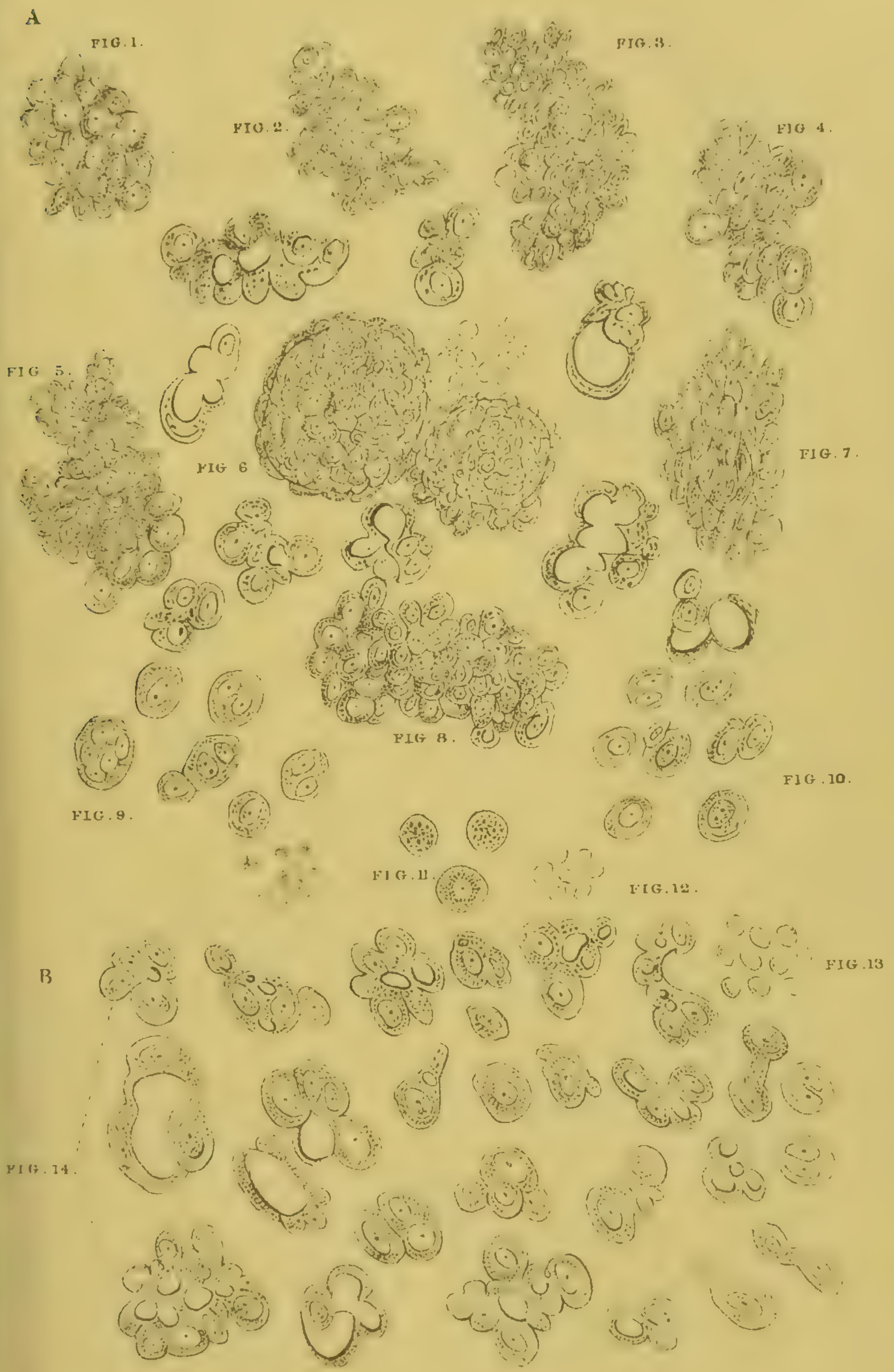


Fig. 129.

Section through cyst wall, shewing papillæ covered with columnar epithelium and sub-epithelial layer of connective tissue (Rindfleisch) $\frac{200}{1}$.

The papillæ may coalesce and form retention or daughter cysts. Microscopically we have already noted that in cases of hydrops folliculorum, where the size is that of a bean, the ovum has been found.


A
FIG. 1.
FIG. 2.
FIG. 3.
FIG 4.
FIG 5.
FIG 6
FIG. 7.
FIG 8.
FIG. 9.
FIG. 10.
FIG. 11.
FIG. 12.
B
FIG. 13
FIG. 14.

Microscopic anatomy.—The wall of the cysts is made up of stratified connective tissue lined by columnar epithelium. In the *glandular* form (cystoma ovarii proliferum glandulare), the *epithelium* grows more outwards and forms occluded follicles in the cyst wall; in these again other follicles may develope. In the *papillary* form (cystoma ovarii proliferum papillare), the *connective tissue* of the cyst wall sprouts out pushing the lining of the cyst before it; these papillæ are covered with the columnar epithelium of the cyst.

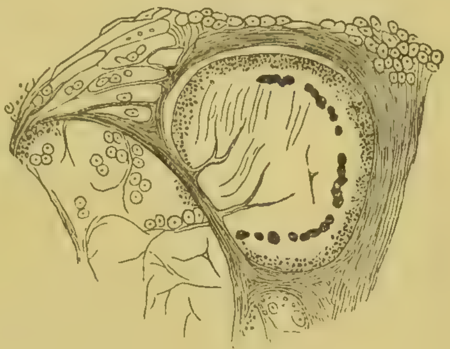


Fig. 130.

Colloid degeneration of ovarian stroma (Rindfleisch).

Dermoid cysts are due to abnormal inclusion of the epiblast, *i.e.*, are developmental in their origin. They have an outer fibrous coat and an inner one composed of true skin. They may contain hair, teeth, bone, striped muscle, nervous matter, cholesterine, and sebaceous matter.

The *cystoma malignum* is a cystic tumour which has undergone malignant degeneration. It is noteworthy that malignant disease often developes after the removal of an apparently simple tumour.

THE NATURE OF OVARIAN FLUIDS AND OF PAROVARIAN FLUID.

Ovarian fluid varies much in consistence and colour. It is usually viscid, and may be so thick as to be almost gelatinous. Its colour is yellowish or greenish; and the specific gravity, when of the more fluid consistence, varies from 1010 to 1020. Chemically, the fluid is complex. Eichwald's results are those usually given.

"According to Eichwald the fluid contents of the cysts may be divided into two distinct classes of elements. The elements of the first class can always be distinguished from those of the second. On the other hand, the individual members of one class can only be separated from each other when one or more of the intermediate members are wanting.

"The two groups consist of the mucous matters and the albuminous matters In the contents of large (old) colloid cysts the elements of the second class are apt to predominate, just as the elements of the mucous class do in the contents of the younger cysts.

"The first group is made up of the mucous elements, which are found to be variously modified. These are formed from the substance of the colloid bodies, and from the transformed parenchyma of the cells. From this mucine is formed, which, while not soluble in water, is found in the cysts in a hydrated condition. By a series of intermediate changes the mucine becomes gradually converted into the muco-peptone, which is very readily soluble in water, for mucine by degrees assumes the property of dissolving in water, and loses its peculiarity of being precipitated by acids. This substance, which, as we have seen, is produced by mucine changing into muco-peptone, and is therefore a sort of modified mucine, is the so-called colloid substance. This colloid degeneration is therefore nothing else than a mucous metamorphosis. The mucine group consists, therefore, of :—

"1. Substance of the colloid corpuscles. Only soluble in diluted alcohol; perfectly precipitated by acetic acid.

"2. Mucine. Also soluble in alkaline earths, and becomes hydrated in water; perfectly precipitated by acetic acid.

"3. Colloid substance. Slightly soluble in cold, but more soluble in hot water. Becomes turbid on the addition of acetic acid, but does not form a perfect coagulum.

"4. Muco-peptone. Very easily soluble in water; not precipitated by acetic acid.

"The other class is the albuminous. The albumen is found in colloid ovarian cysts under two forms, as free albumen and as albuminate of soda. The former coagulates by simply boiling; the latter only on the addition of an acid. The former, the free albumen, is always changed in colloid tumours into albumino-peptone, while the albuminate of soda remains unaltered. This change takes place very gradually. First, the property of coagulating on being heated is lost—it becomes paralbumen; then it loses by degrees the property of being precipitated by the mineral acids, and becomes a metalbumen. Paralbumen and metalbumen are, however, not fixed bodies, but their peculiarity consists in their gradual change from free albumen to peptone.

"The albuminous group consists of :—

"1. Albumen (fibrine);
"2. Paralbumen;
"3. Metalbumen;
"4. Albumino-peptone (fibro-peptone).

"The peculiarities of the several component parts are the same as those of the components of the mucine class. They are distinguished from the mucine class by the fact that they contain sulphur, and by their being precipitated by tannin and the neutral metallic salts. Since albumen gradually changes into peptone, a process takes place exactly like that of digestion.

"On boiling, the contents of the cysts will be found to vary according to the amount of free albumen present. The fluid is perfectly clear if all the free albumen remains unchanged, but on the addition of acid it always becomes turbid, inasmuch as it then invariably contains the albuminate of soda."—(*From Schrœder.*)

Ovarian fluid does not give a flocculent precipitate as ascitic fluid does.

The corpuscular elements of ovarian fluids are various. There may be oil globules, cholesterine crystals, blood fresh or altered, with large granular cells.

Hughes Bennett of Edinburgh and Drysdale of Philadelphia have described a corpuscle, seen at fig. 131, as characteristic of ovarian fluids. According to Drysdale it "is generally round, delicate, transparent, and contains a number of granules but no nucleus;" its size varies from $\frac{1}{3000}$ of an inch to $\frac{1}{2000}$ of an inch in diameter. Acetic acid added to pus makes the cells larger and brings nuclei into view; while it only increases the transparency of the ovarian cell and makes its granules more evident.

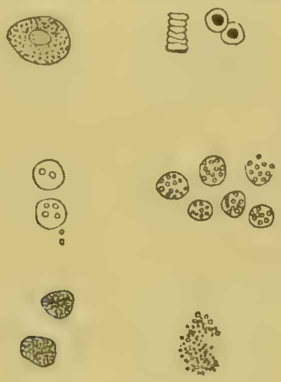


Fig. 131.

Some cellular elements of ovarian fluid. At the upper right hand corner we have red blood corpuscles. Below these lie the granular ovarian cells, and below them free granular matter.

At the upper left hand corner is shewn an epithelial cell; below it, a pus cell after addition of acetic acid; and below this, pus cells before addition of acetic acid (Drysdale).

Parovarian fluid is little more than a solution of salt and to the naked-eye is just like clear water. It contains no cellular elements.

SOLID OVARIAN TUMOURS; MALIGNANT TUMOURS AND THE NATURE OF THE ASCITIC FLUID ASSOCIATED WITH THEM.

Non-malignant (fibrous* and cartilaginous) tumours are rare. A tubercular condition of the ovary is found as part of general tuberculosis.

Malignant disease of the ovary is a comparatively frequent occurrence. It often complicates cystic degeneration, specially the papillary form of ovarian cyst. It arises also independently, and may occur either in the scirrhus or medullary form. The most important feature is the rapid development of ascites, without the existence of cardiac, hepatic, or renal disease to explain it. Of great importance are the cells in the ascitic fluid associated with malignant ovarian disease. Dr Foulis of Edinburgh has investigated this subject, and has brought out results of very great value. Through his kindness we have been able to reproduce in Plates VI. and VII. the cells he has drawn attention to; and he has kindly furnished us with the following description :—

---

* In London Obst. Trans., Vol. XX., p. 276, is an interesting case (with plate) reported by Cullingworth as fibroma of both ovaries. Each ovary was converted into a solid nodulated tumour—one the size of a fist, the other larger. There was no ascites. The microscopic examination gave suspicion of *commencing sarcoma*. The literature of fibroma ovarii is fully given in this paper.

"*A*. Sprouting cell groups found in ascitic fluid surrounding a large cysto-sarcoma of the ovary.

For a history of this case see Edin. Med. Jour., 1875. p. 838.

In figures 3, 4, 5, 7 great variation in form and size of the cells in each group is seen. The largest cells are generally seen at the margins of the groups.

Fig. 9. Several large polynucleated cells, evidently detached from cell groups.

Fig. 11. Cells undergoing fatty degeneration.

Fig. 12. Blood corpuscles.

"*B*. Cell groups found in the deposit from ascitic fluid surrounding a large soft malignant tumour of the ovary. In many of the cell-masses large vacuoles are seen.

"*C*. Cell groups found in the deposit from ascitic fluid surrounding a large flat, or pancake-shaped, tumour of the omentum. The tumour was thought to be ovarian. In the fluid in the pleural sacs exactly similar cells and cell groups were seen, and the pleural surface of the diaphragm was studded over with cancerous nodules.

"*D*. Cell groups found in ascitic fluid in the case of a gentleman, aged seventy, suffering from malignant peritonitis. In the centre a very large cell mass, with numerous vacuoles in the substance of the protoplasm, is seen.

All the cell groups and cells were drawn by the aid of the camera lucida under a power of 350 diameters, with No. 3 ocular."

To illustrate the development of the normal ovary and of the Graafian follicles, we have added the following figures from Foulis' paper on this subject :—

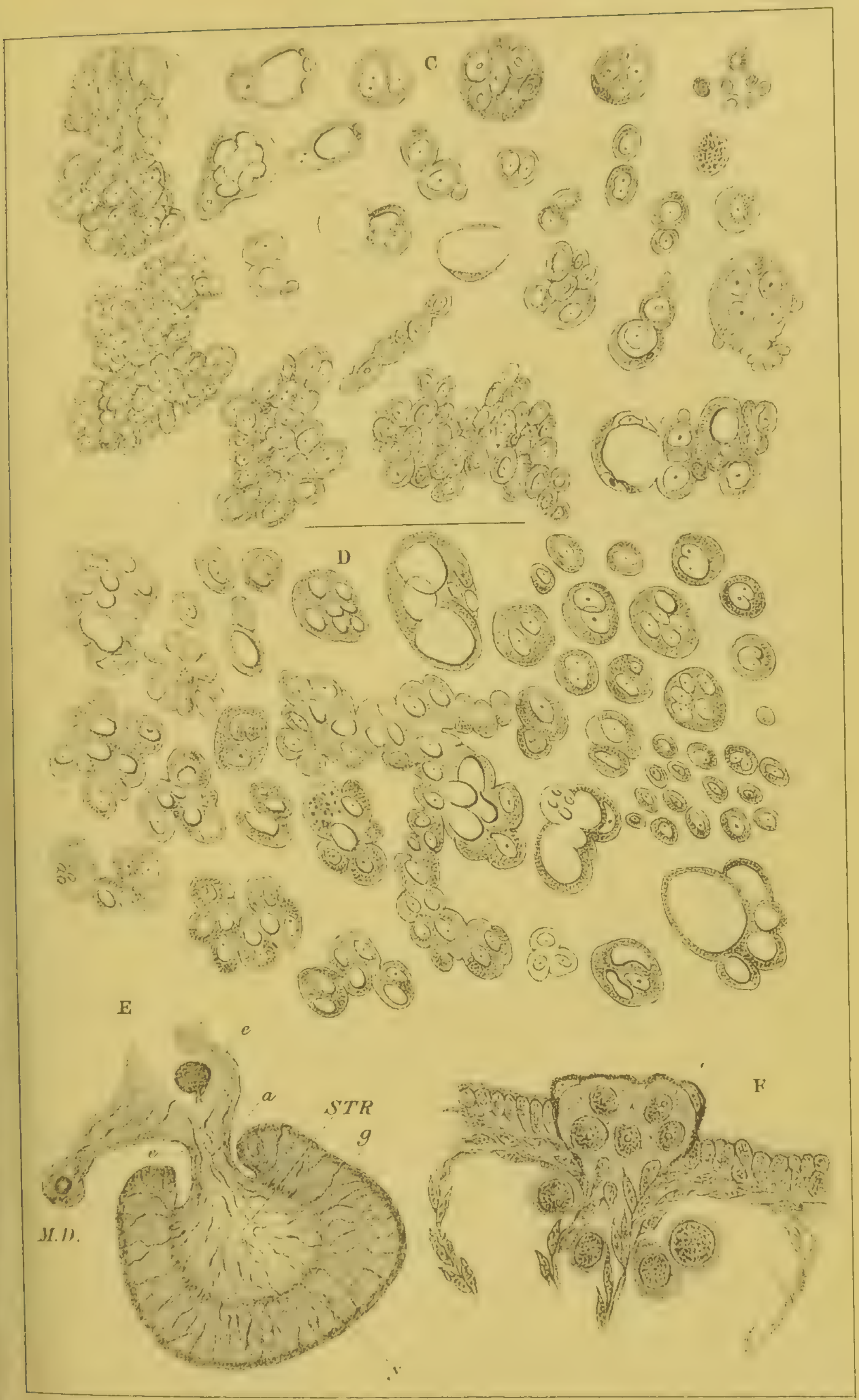
"*E*. Section through ovary and Wolffian body of a fœtal lamb.

a stalk of ovary, *STR* stroma, *MD* duct of Müller, *e* epithelium of peritoneum, *g* germ epithelium, *y* deepest part of the parenchymatous zone of the ovary.

"*F*. Connective tissue sprouting up and surrounding the germ epithelium."

It is probable that these liberated cells found in ascetic fluid graft themselves on the peritoneum, and pass through the diaphragm into the pleura and pericardium. They behave just as we have seen bacteria do. (*Vide* p. 151).

PLATE VII.



CHAPTER XXI.

DIAGNOSIS OF OVARIAN TUMOURS.

LITERATURE.

Atlee, W. L.—The General and Differential Diagnosis of Ovarian Tumours : Lippincott & Co., Philadelphia, 1873. On Sarcoma of the Ovaries : Am. Gyn. Tr., Vol. II. *Barnes*—Op. cit. p. 400. *Brown, J. Baker*—Surgical Diseases of Women : London, 1866. *Duncan, J. Matthews*—Clinical Lectures : London, Churchill, 1880. *Hicks, Braxton*—Further Remarks on the Use of Intermittent Contractions of the Pregnant Uterus as a means of Diagnosis : Lond. Inter. Congress Tr., 1882. Also Tr. of Lond. Obst. Soc., Vol. XIII., and Proc. of Royal Soc. of Lond., 1878. *Jastrebow*—On a point in the Diagnosis of Ovarian Tumours : Lond. Inter. Congress Tr., 1882. *Olshausen*—Op. cit. *Ritchie, C. G.*—Contributions to Ovarian Physiology and Pathology : Churchill, London, 1865. *Schrœder*—Op. cit. S. *Tait, Lawson*—Op. cit. *Williams, John*—Article, Ovarian Tumours : Reynold's System of Medicine, Vol. V. *Wells, T. Spencer*—Diseases of the Ovaries : Churchill, London, 1872. Lectures on the Diagnosis and Surgical Treatment of Abdominal Tumours : Br. Med. Jour., 1878.

For convenience we take up the diagnosis and differential diagnosis of ovarian tumours under two heads :—

A. When small, and pelvic in position ;
B. When large, and chiefly abdominal in position.

A. WHEN SMALL, AND PELVIC IN POSITION.

They may be either (*a.*) Lateral to uterus, or (*b.*) Posterior to uterus.

(*a.*) *Pelvic ovarian tumours lateral to Uterus.*

1. *Symptoms.*—These are chiefly those of pressure and bearing down, and have no diagnostic value. There is no menorrhagia.

2. *Physical signs.*—Palpation and percussion give evidence of the presence of a tumour only when it projects much above the brim. Auscultation gives negative results. On vaginal examination, the cervix is found displaced to the side opposite to that where the tumour is. Through the fornix a tense, rounded, fluctuating mass is felt projecting downwards. Bimanually the uterus is felt not enlarged, but is displaced to the one side and is distinct from the tumour, which

can be mapped out between the hands. Usually the uterus and tumour are not very movable, owing to the limited space of the pelvic cavity. When the tumour is tapped, ovarian fluid is got.

3. *Differential diagnosis.*—When *lateral* to the uterus they require to be differentiated from the following :—

(1.) Pelvic cellulitis ;
(2.) Pelvic peritonitis (encysted serous effusions) ;
(3.) Parovarian cysts ;
(4.) Hydrosalpinx, Pyosalpinx ;
(5.) Fallopian tube gestation ;
(6.) Fibroid and fibro-cystic tumours of uterus ;
(7.) Blood effusion ;
(8.) Solid ovarian tumours.

(1.) *Pelvic cellulitis.*—With this we have inflammatory history and probable cause, as abortion or labour, to guide us. When the cellulitis has gone on to suppuration, there will be rigors and other indications of suppuration. Cellulitic deposits are almost always fixed ; are firm when not purulent, and even when purulent do not give very distinct fluctuation.

(2.) *Pelvic peritonitis.*—This will not cause the fornix to bulge downwards, and the history will help us. Tapping gives serum, and not ovarian fluid. When an ovarian tumour is fixed by peritonitic adhesions, it will be almost impossible to diagnose it from encysted pelvic peritonitic effusion except by examination of the fluid.

(3.) *Parovarian cysts* are not so rounded and have very distinct fluctuation ; their secretion is simple salt and water, and when tapped they do not recur.

(4.) *Hydrosalpinx and pyosalpinx* are high in pelvis, tortuous, elongated from side to side.

(5.) *Fallopian tube gestation* (*v.* extra-uterine gestation under Section IX).

(6.) *Fibroid and fibro-cystic tumours of uterus* (*v.* Section V).

(7.) *Blood effusion* in the broad ligaments is difficult to diagnose during life, and is chiefly discovered on operation or post mortem. The same is true of Hæmatometra.

(8.) *Solid ovarian tumours* are rare. When malignant there are often nodules in the fornices and ascitic fluid which shows the cells shown at Plates VI. and VII.

b. Pelvic Ovarian Tumours posterior to Uterus.

1. *Symptoms.*—The most striking one is associated with urination ;

there is either retention or constant desire to micturate. There is no menorrhagia.

2. *Physical signs.*—Palpation, auscultation, and percussion give the same result as when the tumour is lateral. On bimanual examination, the uterus is felt markedly displaced to the front but is not enlarged ; and bulging downwards behind the cervix, the round globular cystic ovary can be grasped. Tapping gives ovarian fluid.

3. *Differential diagnosis.*—When *posterior* to the uterus, they require to be differentiated from the following conditions.

(1.) Encysted serous peritonitic effusion,
(2.) Retro-uterine haematocele,
(3.) Fibroid and fibro-cystic tumours of the uterus,
(4.) Retroverted gravid uterus and extra-uterine fœtation,
(5.) Parovarian cysts.

(1.) *Peritonitic effusion* has an inflammatory history; it is not so rounded nor so well defined above. The fluid is serous.

(2.) *Retro-uterine hæmatocele* has, after the blood has coagulated, a hard feeling and is more expanded transversely. There is a history of sudden onset, menorrhagia, and subsequent inflammatory symptoms.

(3.) *Fibroid and fibro-cystic tumour of the uterus* (*v.* Section V.).

(4.) *Retroverted gravid uterus and extra-uterine fœtation* (*v.* Section IX.).

(5.) *Parovarian cysts.*—The character of the fluid is our only certain guide.

It should be specially noted that these pelvic ovarian tumours are apt to cause *pelvic inflammation* and thus render the exact diagnosis, unless aided by tapping, very difficult.

B. DIAGNOSIS OF OVARIAN TUMOURS WHEN LARGE, AND CHIEFLY ABDOMINAL IN POSITION.

1. *Symptoms.*—These are chiefly due to its bulk. The patient's notice is attracted to the fact that she is getting rapidly stout. Recently, Jastrebow has alleged that the sensibility of that part of the groin supplied by the genitocrural nerve is impaired on the same side as that on which the tumour is.

2. *Physical signs.*—When the patient lies on her back and the abdominal surface is bared, the following points can be noted.

On *inspection* the abdomen is seen to be greatly distended. The distention may be uniform, but is often more or less markedly lateral. The distance from the anterior superior spinous process to the umbilicus is greater on one side than the other. The superficial abdominal veins may be dilated, and lineæ albicantes are sometimes present.

On *palpation*, the distention is felt to be due to an encysted collection of fluid. A mass is felt in the abdominal cavity which is like a sac filled with fluid. Fluctuation is got by placing one hand at a special part and tapping at an opposite point with the fingers of the other hand. However long the tumour be manipulated, *there is never felt any muscular contraction of the cyst wall.*

On *percussion* when the patient lies dorsal, a dull note is obtained over the tumour (fig. 132); but at the flank, where the tumour does not bulge, it is clear and tympanitic, since the intestines are there. When the patient turns on her side, with this flank uppermost, the dulness and tympanitic note do not change in position. This sign shows we have to deal with an *encysted* collection of fluid.

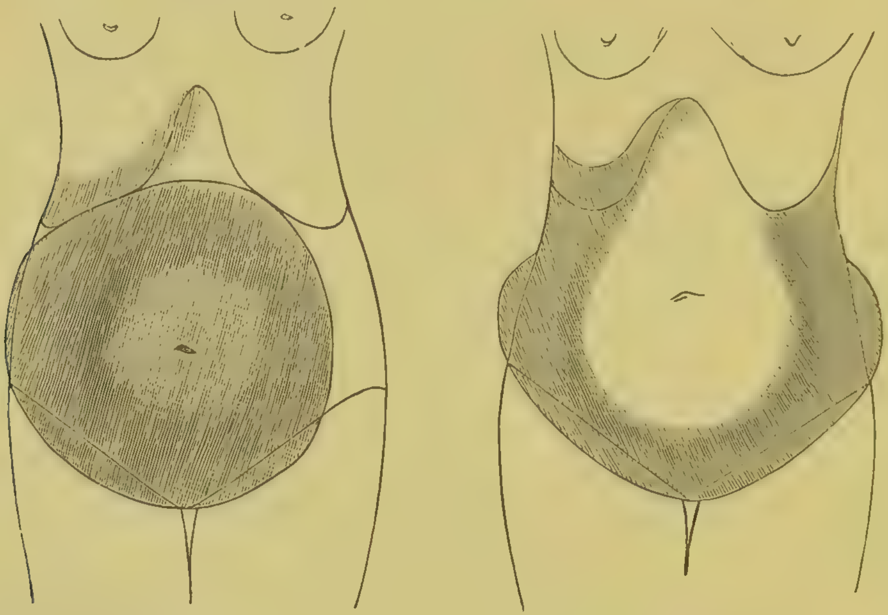


Fig. 132.

The shaded portion shows the dull area; left figure—ovarian tumour, right figure—ascites (Barnes).

Auscultation gives entirely negative results. No sound is heard unless that of friction over a localised peritonitis.

On *vaginal examination*, the uterus is felt displaced to one or other side, or very much to the front. It is rarely retroverted, and—unless impregnated—is not enlarged. The tumour does not usually bulge down into the fornices, but may be made out bimanually.

In order to ascertain how the pedicle lies, we have to make the examination *per rectum*. The tumour is drawn upwards in the abdominal cavity by an assistant. We now lay hold of the cervix with a volsella, pass the index finger of the right hand into the rectum, make traction on the cervix till the fundus is brought within reach of the rectal finger. We recognise a tense band passing from one angle of the fundus, and the enlarged ovarian artery may be felt pulsating in it. We now examine for the ovary of the opposite side; this is ascertained to be normal in size. The possibility of both ovaries being cystic (which would produce a pedicle on each side), should not be forgotten, though this is comparatively rare. The examination with the volsella is made easier by placing the patient *in the genupectoral posture ;* the weight of the tumour makes it gravitate into the abdomen, and renders the pedicle tense ; it is also easier to make the rectal examination in this position.

3. *Differential Diagnosis of Abdominal Ovarian Tumours.*

They must be diagnosed from the following conditions :—

(1.) Pregnancy and Hydramnios,
(2.) Fibroma uteri,
(3.) Ascitic fluid,
(4.) Fibrocystic tumours of the uterus,
(5.) Parovarian tumours,
(6.) Encysted dropsy,
(7.) Thickened omentum enclosing intestines by adhesions,
(8.) Omental tumours,
(9.) Renal tumours,
(10.) Hydatid of liver,
(11.) Pseudocyesis,
(12.) Distended bladder.

In observing a case of abdominal tumour, the student makes first his positive examination systematically ; he makes in every case what is called the routine examination, noting what he observes. By this means he may get facts enough to warrant his drawing a distinct conclusion as to its nature. This, however, is not always the case ; he has then to use diagnosis *by exclusion ;* it must be one of a certain fixed number of things ; the possibilities are excluded one by one till a definite diagnosis is reached.

We have stated above that ovarian tumours require to be diagnosed from twelve conditions. On each of these we make some brief remarks.

(1.) *Pregnancy.*—At the period of pregnancy when the uterus is so enlarged as to be above the pelvic brim, certain conditions are present. These are suppression of menstruation for a given period, and size of the uterus corresponding to this ; mammary signs ; lineæ albicantes, and pigmentation. On palpation, we feel a tumour without distinct fluctuation and *having intermittent contractions* ; the fœtus can be palpated out. The fœtal heart (after the fourth month) and the uterine souffle are heard. The vagina is dark in colour, the mucous secretion increased, and the cervix soft.

We need hardly say that the palpation, the fœtal heart-sounds, bruit and vaginal changes mark out the pregnancy unmistakeably. These points may seem too simple to require mention, but cases have been recorded where the pregnant uterus has been tapped for an ovarian cyst.

Hydramnios may simulate an ovarian cyst. The amenorrhœa will help and especially the occurrence of intermittent contractions as Braxton Hicks has specially pointed out. In one of his recorded cases, the tumour was the size of a seven months' uterus with distinct fluctuation, and there was amenorrhœa for five months. Palpation gave the uterine hardening. Previous to this it had been tapped as a cystic ovarian tumour.

(2.) *Fibroma uteri* (*v.* Section V.).

(3.) *Ascitic fluid.*—When the patient lies on her back, percussion gives a tympanitic note at the umbilicus and a dull one at the flanks (fig. 132) ; when on her left side, the note is dull on that side and clear over the right; when on her right, it is dull on that side and tympanitic on the left ; when she sits up, the upper limit of the dulness is curved with the convexity downwards.

The reason of this is evident. The intestines float on the fluid at its highest point and give the tympanitic note accordingly (fig. 132).

(4.) *Fibrocystic tumours of the uterus* are difficult to diagnose. The following points should be noted. Fluctuation is only partial, and the consistence is variable ; the rate of growth is slower ; and the fluid drawn off coagulates spontaneously. It is often difficult to separate these from ovarian tumours, and the best operators have sometimes failed to do so (*v.* Section V.).

(5.) *Parovarian tumours* have very well marked fluctuation, have their characteristic fluid, and when once tapped do not refill as they are mere retention cysts.

(6.), (7.), and (8.) In many cases we can make out that the tumour does not pass down into the pelvis and is not connected with the uterus. Sometimes the case is obscure, and abdominal incision alone clears matters up.

(9.) *Renal tumours* grow downwards and inwards. When right-sided, the tympanitic colon lies between them and the liver. Their fluid contains urea.

(10.) The connection of the *hydatid* with the liver can be made out.

(11.) In *Pseudocyesis* the percussion note is tympanitic, and the swelling disappears under chloroform.

(12.) The *distended bladder* is of course emptied by the catheter.

DIAGNOSIS OF ADHESIONS.

When pelvic, the thickening they cause can be felt. Tappings are one great cause of adhesions; they may also arise from mere pressure. Careful inquiry should always be made as to the history. On palpating the tumour, one can often feel friction. On making the patient take a deep breath, it should be noted whether the abdominal walls move over the surface of the tumour. Much less importance is attached now-a-days to the existence of abdominal adhesions. When pelvic, especially if to the bladder or deep in the pouch of Douglas, they are more serious.

CO-EXISTENCE OF PREGNANCY AND OVARIAN TUMOUR.

It should be kept in mind that pregnancy may co-exist with an ovarian tumour, giving its own special symptoms and physical signs in addition.

CHAPTER XXII.

OPERATIVE TREATMENT OF OVARIAN TUMOURS.

LITERATURE.

Atlee—Op. cit. *Bantock*—First Series of Twenty-five Cases of Completed Ovariotomy: Brit. Med. Jour., 1879, p. 766. *Cheyne, Watson*—Antiseptic Surgery: Smith, Elder, & Co., London, 1882. *Hegar and Kaltenbach*—Die operative Gynäkologie: Stuttgart, 1881, S. 201. *Lister*—Address on the Treatment of Wounds: Lancet, Nov. 19 and 26, 1881. *Miner*—Ovariotomy by Enucleation: Philad. Intern. Cong. Tr., 1877. *Mundé, P. F.*—The Value of Electrolysis in the Treatment of Ovarian Tumours: Am. Gyn. Tr., Vol. II., p. 348. *Sims, J. M.*—Thomas Keith and Ovariotomy: Am. Jour. of Obst., April 1880. *Tait, Lawson*—On Axial Rotation of Ovarian Tumours leading to their Strangulation and Gangrene: London Obst. Tr., Vol. XXII., p. 86. The Antiseptic Theory tested in Ovariotomy: Lond. Med. Chir. Tr., Vol. LXIII., p. 161. Recent Advances in Abdominal Surgery: London Intern. Cong. Tr., 1882. *Thornton*—The Silk Ligature as a means of securing the Ovarian Pedicle: Brit. Med. Jour., 1878, p. 125. *Wells, T. S.*—Op. cit. Recent Advances in the Surgical Treatment of Intraperitoneal Wounds: London Intern. Cong. Tr., 1882. Additional Cases of Ovariotomy performed during Pregnancy: London Obst. Tr., Vol. XIX., p. 184.

Removal of the ovarian tumour by abdominal or vaginal section—in almost all cases abdominal—is the treatment now practised. Other methods have, however, been employed; a brief *resumé* of these will be useful to the student.

These methods have been tapping, tapping and injection of the cyst with iodine, electrolysis, drainage into the peritoneal cavity or through the vagina.

Tapping is not a method of treatment followed by cure, and should be used only when it is necessary to obtain fluid for diagnosis. It cures parovarian cysts, as these are mere retention cysts. Ovarian cysts are not retention cysts but have a proliferating lining membrane, for which reason tapping does not cure them. An additional reason against tapping is that it is a procedure by no means free from danger, even to life. By oozing of the fluid through the puncture, adhesions are set up; in some cases, septic peritonitis has proved fatal. Tapping, further, is only palliative and must be followed by ovariotomy.

Method of Tapping.—See that the bladder is empty. With the patient lying on her back make an incision through skin and fat for about an inch, and midway between umbilicus and pubis. Then plunge in the trocar seen at fig. 134. To the side-tube a long piece of tubing is attached, which dips under water. While the fluid is flowing, the patient lies on her side. No bandage is necessary. Care should be taken to prevent regurgitation of air, and a suitable dressing should be applied to the wound (*vide* under Ovariotomy).

Tapping and injection of the cyst with iodine is a procedure not now practised, owing to the risks and uncertainty attending it.

Electrolysis was at one time advocated as a means of cure. Its pretensions to this are unfounded, and no operator now practises it. Its use has been carefully considered by Mundé of New York in the article cited, which may be consulted for details and information.

Drainage into the peritoneal cavity, or through the vagina.—The former is dangerous, and the latter is only practised in those cases where the cyst is immovably fixed by adhesions.

One fact must be finally noted. Cases of cure of ovarian cysts by tapping, drainage, or electrolysis, are sometimes recorded. These cysts have probably not been ovarian, but cysts of the broad ligament—parovarian. Mere tapping often cures the latter. Electrolysis does the same. Electricity has nothing to do with it, the puncture of the needle is enough.

OVARIOTOMY.

This is performed by vaginal or by abdominal incision. The former is very rarely employed, the latter is the usual method.

VAGINAL METHOD.

This may be practised when the tumour is pelvic and small. Thomas of New York, Goodell of Philadelphia, Gilmore, Hamilton and others have recorded cases. The following is the plan of procedure.

Chloroform or etherize the patient. Place her semiprone or in the lithotomy posture. Pass the Sims speculum. Incise the posterior vaginal wall behind the cervix, in the middle line. Tap the tumour with an aspirator, and then draw it through the incision with the finger or curved forceps. Ligature the pedicle with thin carbolised silk threaded on a handled needle, and divide it on the distal side. Pass a

T-shaped drainage tube into the wound which may be stitched round it or left open. Should the temperature rise or the discharge become fœtid, irrigate daily with weak carbolic lotion (1-100).

Encouraging results have been got by this method.

ABDOMINAL METHOD.

These questions are often asked. When is the best time to operate on an ovarian tumour? Should it be removed when small or should the operator wait until it is of good size? If the latter, how large should it be?

It is better not to operate by this method when the tumour is small, but to wait until its size is that of a six months' or nine months' pregnancy. A tumour of this size has displaced the small intestine from its usual position behind the anterior abdominal wall, and has stretched and thinned out somewhat the latter. The abdominal incision is therefore more easily made and the intestines are out of harm's reach. Of course it should not be forgotten that, when the medical man is consulted, ovarian tumours have usually become abdominal and large.

Let us suppose then that the ovariotomist has a patient—who is otherwise healthy—with an ovarian tumour free from adhesions, and that her period has occurred ten days before. How is the operation performed?

If the patient has not been in any way confined to bed, it is probably better to delay the operation till another period has passed, in order to accustom her to an invalid's life. She is kept on light diet, and has no solid food for six hours previous to the administration of chloroform. On the evening prior to the operation, castor oil should be given and an enema used in the morning.

The following are the requisites for operation:—

Chloroform and ether;
Hypodermic syringe;
Spray;
Carbolic lotion;
Porcelain trays for instruments;
Sponges (a definite number), some small and fixed on sponge-holders;
Waterproof, with oval opening of which the edges are coated with adhesive plaster;
Ordinary knives;
Probe-pointed curved bistoury;
Scissors, straight and curved;

Spatulæ;
Dissecting and dressing forceps;
Péan's or Well's artery forceps—a definite number (20) of pairs;
Tenacula, blunt hooks;
Needles on fixed handles;
Aneurism needle;
Fine catgut for bleeding vessels;
Carbolised silk (Nos. 3 and 4);
Two pair ovariotomy forceps (Nélaton's or Keith's);
Well's trocar;
Clamp (in reserve);
Cautery, actual or Paquelin's;
Cautery-clamp;
Long straight needles, threaded two on each suture of silk-worm gut;
Needle holder with small needles on horse hair sutures;
Drainage tubes (glass or ordinary);
Carbolic gauze, protective silk, mackintosh, flannel bandages.

The assistants necessary are five or six in number, viz., one for chloroform, one for instruments, one to help the operator, one to look after the spray, and one for the cautery. A trained nurse who can pass the catheter and administer purgative or nutritive enemata, is necessary. The patient is placed on an ordinary table, of convenient height and length, and lies on her back. The table is placed so that the patient's feet are towards the window. The legs and chest are to be warmly covered, and hot water bottles should be laid at her side and feet. The room should be comfortably warm. The best position for the operator is to stand on the patient's right side, with his back to her feet and to the window. The question of the use of antiseptics in ovariotomy will be discussed afterwards. The instruments are placed near the operator in shallow porcelain trays, and in 1-40 carbolic solution.

The sponges should be soft, fine, and thoroughly clean. Seven or eight are sufficient. Some are small and on sponge holders; one is large and flat. They should be thoroughly wrung out of warm 1-60 solution. *The sponge assistant should know how many sponges he has, and should be sure that he has recovered them all before the abdominal wound is closed. Sponges should never on any account be torn up during an operation.*

The spray, if used, should be placed eight or ten feet from the wound, and should throw out a finely-divided vapour.

Preliminaries.—The patient, who has had a very light breakfast some hours previously, should be chloroformed; the skin washed and shaved; and the waterproof made to adhere to the skin, so that the incision shall bisect the portion exposed through the oval opening. This waterproof keeps the patient dry and comfortable.

The following are the steps of an ordinary operation :—

1. The abdominal incision;
2. Evacuation of the cyst contents;
3. Drawing out of the cyst from the abdomen;
4. Its separation at the pedicle;
5. Treatment of adhesions, and bleeding from them;
6. The peritoneal toilette;
7. Closure of the abdominal wound;
8. Drainage—when necessary;
9. Dressing of the wound;
10. After-treatment—complications;

1. *The abdominal incision.*—This is usually four or five inches long, is made in the middle line, and has its lower limit about an inch above the symphysis. It passes through—

skin,
fat,
linea alba,
fascia transversalis,
extraperitoneal fat,
peritoneum.

Sometimes the linea alba is missed, and the rectus muscle cut into. By passing a probe in towards the middle line, the operator gets the right track and thus avoids bleeding. The extraperitoneal fat is a good landmark. All bleeding points are carefully attended to before the peritoneum is opened. They may be seized with Péan's forceps, which are left on for a time, or they may be ligatured with catgut. When the smooth shining peritoneum is reached, it should be hooked up with a fine tenaculum and cut into. The cyst wall is now exposed.

2. *Evacuation of the cyst contents.*—This may be accomplished in various ways. Wells' trocar (fig. 133), with its point projected, is plunged in, and the fluid passes along the thick tube to a suitable pail below the table. As soon as the trocar enters the cyst, the shield is pushed out to guard the point. The trocar has teeth for catching up the cyst wall. Keith uses a large aspirator, so as to empty speedily. Schroeder uses no trocar, but simply cuts in with his knife and squeezes the fluid out. The kneed trocar may be used (fig. 134). When the fluid is

very thick it may not flow and have to be squeezed or scooped out. Secondary cysts, if large, are also perforated.

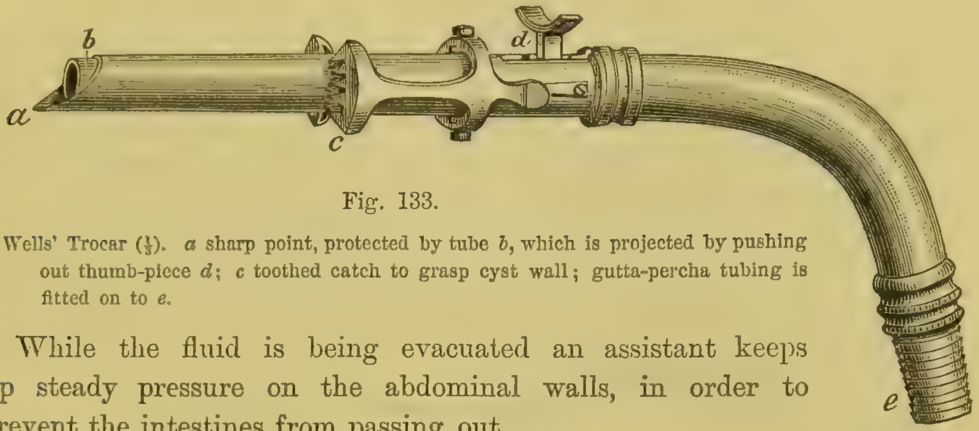


Fig. 133.

Wells' Trocar (⅓). *a* sharp point, protected by tube *b*, which is projected by pushing out thumb-piece *d*; *c* toothed catch to grasp cyst wall; gutta-percha tubing is fitted on to *e*.

While the fluid is being evacuated an assistant keeps up steady pressure on the abdominal walls, in order to prevent the intestines from passing out.

3. *Drawing out of the cyst from the abdomen.*—This is accomplished by seizing the collapsed walls of the tumour with Nélaton's (fig. 135) or Keith's forceps and steadily pulling it out. The assistant still keeps up pressure. By this means, the operator now has the pedicle at the abdominal incision, and the cyst outside.

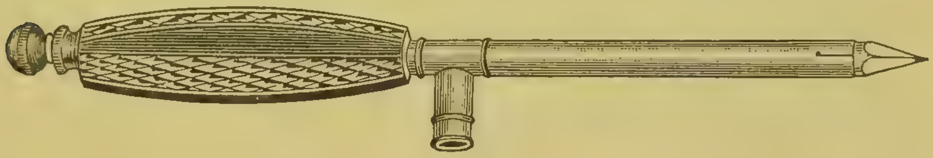


Fig. 134.

Trocar for Tapping. Tubing is fitted to side-piece.

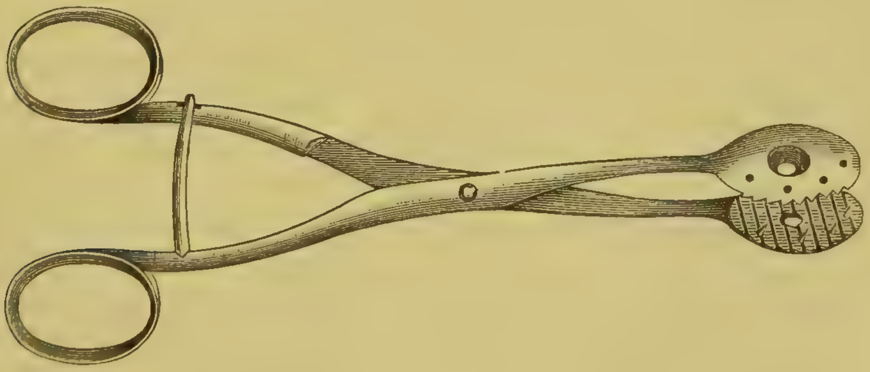


Fig. 135.

Nélaton's Forceps.

4. *Its separation at the pedicle.*—This is one of the most important

steps of the operation. There are three methods which may be used, *viz.*—

The clamp,
The cautery,
The ligature.

Of these, the clamp is now seldom used. Keith and others advocate the cautery; but the ligature and dropping back of the pedicle is the favourite and probably the best method.

The clamp was introduced by Jonathan Hutchinson, but, as already said, is now yielding to the ligature. The varieties of clamp are numerous. Fig. 136 shows Well's; it consists of two short arms jointed together and provided with a screw and removable handles. It is used as follows.

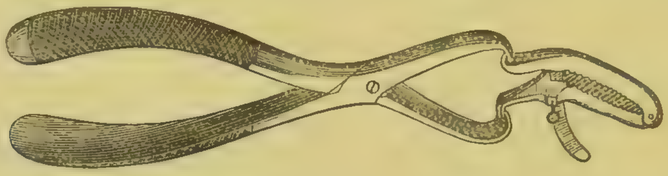


Fig. 136.

Well's Clamp (½), with removable handles, The serrated part with the screw is the clamp proper.

The clamp is held by its handles and made to grasp the pedicle between the cyst and the uterus; the bars of the clamp proper are then approximated, and the screw tightly screwed up. The pedicle is examined to see that it is grasped and equally compressed; if one part is thin, Spencer Wells recommends that the pedicle be first secured with a ligature. The pedicle is treated extra-peritoneally with the clamp, which rests on the skin. The great advantage of the clamp, is its security against hæmorrhage. Its evident disadvantages are the following:—it does not suit all cases, as it cannot be used when the pedicle is too large or too short; it may cause ventral hernia; it exercises undue traction on the uterus; but, above all, it may cause a slough deeper down than the skin, and the discharges, passing into the peritoneal cavity, may do great mischief.

The cautery was introduced, as a means of treating the pedicle, by Baker Brown of London. It gives better results than the clamp.

In order to use the cautery, we need a special cautery-clamp and either cautery irons or Paquelin's cautery. Keith uses ordinary cautery irons heated in a little charcoal brazier. The *cautery-clamp* has two hinged bars provided with handles; each bar has one surface which is made of ivory—a non-conductor—and is placed next the skin; the other surface is made of metal; one of the bars has on its metal surface a metal upright running the whole length of the bar. The pedicle is seized with the clamp (ivory side next to the skin), and the screw turned to fix it. Then the cyst is cut off, so as to leave about an inch of the pedicle on the metal side. The dull cautery iron, which is hatchet shaped, is then passed firmly over the surface, in the angle between the horizontal bar and the upright, until the pedicle is seared flush with the clamp. The pedicle is now caught at the under surface of the clamp with two pairs of forceps, and the clamp removed. If all is right, it is dropped into the abdomen after the peritoneal toilette is finished.

The ligature should be thin carbolised Chinese silk No. 3 or 4. It is used in the following way:—

A double silk ligature is threaded on a *blunt* needle. The pedicle is transfixed with this, and the ligature cut. Thus we have two ligatures through the pedicle; one is passed round the one half of the pedicle, the other round the other half. They may be made to interlace first so as to make a figure of eight. Each is tied firmly in a reef knot. The pedicle is then seized with Pean's forceps, one on each side just below the ligature; the cyst is clipped off about half an inch on the cyst side of the ligature; as the pedicle is still held up by the forceps it can be carefully examined to see if any bleeding occurs. It should be noted whether the ligature splits the pedicle vertically so as to cause bleeding; if so, the ends of the thread can be made to surround the whole pedicle below this. If there is no bleeding, the ligature is cut short and the pedicle dropped into the pelvis.

The raw end of the pedicle may be stitched with catgut to the broad ligament, so as to prevent its adhering to and constricting intestine (Thornton).

When the pedicle is thick and fleshy it may require to be tied in three portions as follows:—Pass a double thread so that its shorter half will embrace only *one third* of the pedicle; withdraw the needle, but keep it still running on the thread, and use it to carry the longer half of the thread through at a second point so as to embrace the *middle third* of the pedicle; one portion of the longer half thus forms a loop round the middle third, while the other portion embraces the *other third* of the pedicle.

After the pedicle has been secured by one of these methods, the other ovary should be examined and if cystic removed also.

The distal portion of the pedicle does not slough; according to Thornton we may have the five following results.

(1.) Adhesion of the peritoneal surfaces on opposite sides of the ligature, and absorption of ligature.

(2.) Lymph effused over ligature and end of stump, formation of new vessels.

(3.) Adhesion of pedicle raw surface to some neighbouring peritoneal surface and passage of bloodvessels between.

(4.) Hæmorrhage from pampiniform plexus at outer edge.

(5.) No change or sloughing if patient dies soon.

5. *Treatment of adhesions and bleeding.*—The adhesions, in certain cases, may give a great deal of trouble. They may be at any point of the periphery of the tumour. When close to important viscera—especially the bladder, intestine, or liver—they are serious. Their treatment is best considered as follows :—(*a.*) when short, (*b.*) when long.

(*a.*) When they are *short* and connected with the anterior abdominal wall, the cyst is sometimes cut into. The operator then separates the cyst from the wall, by passing his finger in between them where the adhesion ceases; or he may evert the abdominal wall, and strip the cyst off it with dissecting forceps. Spencer Wells recommends in bad cases to evacuate the cyst, and then, by seizing the posterior wall of the cyst with a hand passed into the interior, to evert it and afterwards separate the adhesions. Pressure or the ligature will arrest any bleeding, or the cautery may be applied. If the bleeding is intractable, a good plan is to pinch up the abdominal walls at the bleeding part and pass a long straight needle through this fold, so as to keep the bleeding peritoneal surfaces in apposition.

(*b.*) When the adhesions are *long*, they may be ligatured at two points close to the cyst and divided between these.

When adhesions to the bladder are present great care must be taken, as, in separating them, the bladder may be torn into. If this happens, the tear should be stitched with fine catgut, and a catheter kept in for some days. (*Vide* under vesico-vaginal fistula.) When adhesions are inseparable, the adherent portion of the cyst may be ligatured all round with silk and then cut beyond the ligatures; or it may be simply cut all round the adherent portion, and the edges then cauterized.

For reflecting light into the pelvis or other deep parts, an ophthalmoscopic mirror is invaluable.

6. *The peritoneal toilette.*—This term is a convenient one used by German operators to indicate the *cleansing of the peritoneum.* It must be laid down as a cardinal principle in abdominal section that no serum or blood is to be left in the abdomen. The peritoneum should be thoroughly dry, and no oozing points are to be left. The importance of the toilette cannot be too strongly insisted on. Keith of Edinburgh, whose success in ovariotomy is unrivalled, takes the greatest care in this matter and attributes his success to it. Sims indeed says, "But I think now that it matters very little what we do with the pedicle, whether

we use the clamp, the cautery, or the ligature, provided we take every care against the exudation of bloody serum into the peritoneal cavity after the closure of the abdominal wound."

7. *Closure of the abdominal wound.*—This is done as described in Battey's operation (p. 192).

8. *Drainage.*—As to drainage, the rule is that none is needed in simple cases; in cases of many adhesions, however, a glass drainage tube should be passed in at the lower angle of the wound and down into the pelvis. This rule may seem to the student to clash with the invaluable principle that every wound from which there will be discharge ought to be drained. In ovariotomy, however, the peritoneum is an absorbent sac, and the discharge, after a simple operation, is absorbed *before it has time to putrefy* (Lister). In complicated cases, this drainage by absorption is insufficient; it becomes also dangerous from the amount of serum thrown out, and the risk of its putrefying. *External drainage* is, in such cases, imperative.

9. *Dressing of the wound.*—This should be as follows:—a piece of protective silk over the wound, over this two ply of carbolic gauze wrung out of 1-40 lotion, then an eight-ply dressing of dry gauze with mackintosh, and finally padding of salicylic wool; all is secured by a broad flannel bandage. If the pulse and temperature do not rise and there is no uneasiness, this may be left untouched—in simple cases —for eight or nine days. If there is discharge, the dressing should be changed when it soaks through.

10. *After-treatment: treatment of complications.*—Morphia may be given hypodermically, but only when necessary (*vide* p. 155). Little food is allowed for the first thirty-six hours. Hot water should be given *ad libitum*, as it helps flatus. At the end of this time, milk and beef-tea are added. An enema may be administered on the third or fourth day.

Complications may be—Secondary hæmorrhage;
High temperature;
Septicæmia.

Secondary hæmorrhage, if from the pedicle or adhesions, must be treated by the reopening of the wound and application of ligatures.

For high temperatures, the ice-cap is good. The Americans recommend the more wholesale method of reduction of temperature by Kibbee's ice-cot. Krohne and Seseman of London supply very convenient ice-caps made of block-tin pipe. Quinine in fifteen grain doses tried. It is probable that some high temperatures, recorded by ovariotomists, have been due to the absorption by the peritoneum of carbolic acid used in Listerism.

In cases of septicæmia with peritonitis where drainage has been employed, the peritoneal cavity should be washed with very weak carbolic lotion whenever there seems to be any tension or accumulation of putrid fluid; the abdominal incision may require to be re-opened for this purpose. The condition should be further treated by iron and stimulants as needed. (*Vide* treatment of pelvic peritonitis).

THE RELATION OF LISTERISM TO OVARIOTOMY.

The Listerian method of treating wounds is based on the now generally accepted theory that the germ-laden air, coming in contact with a wound, leads to putrefactive charges which may end in septicæmia. Lister found carbolic acid destructive to the activity of these germs; and, consequently, Listerism requires that the air in contact with the wound and all else that touches it, must be purified either with the spray or lotion. Listerism is in no sense a treatment of wounds, but is a *treatment of wound-surroundings.* The application of carbolic lotion to a wound is a necessary evil, as carbolic acid is an irritant and may be absorbed. In the cases treated by the surgeon, Listerism is of the greatest value; and, with drainage, has worked the most mighty revolution in surgery. In peritoneal operations, however, its good is marred by the fact that the peritoneum absorbs the carbolic lotion, and thus its surface is irritated and often toxic effects ensue. Keith, Tait and Bantock have therefore abandoned Listerism in abdominal surgery; but Wells and Thornton still carry it strictly out. It is evident that ovariotomists must find some method which, while locally purifying the air, will yet be innocuous to the wound surface.

Practically most ovariotomists at present trust to modified Listerism, and to drainage when necessary. All Listerian precautions should be used except the spray.

OVARIOTOMY BY ENUCLEATION.

This is a method of ovariotomy introduced by Miner of Buffalo. According to him the pedicle divides into three or four bands containing bloodvessels gradually diminishing in the peritoneal investment of the cyst. The peritoneal covering of the cyst can be slit open and can be readily separated by the finger. The vessels in the tissue between the peritoneum and cyst are capillary and do not bleed. In this way the tumour is enucleated, and the artificial stalk—*i.e.*, peritoneum and pedicle—of tumour either left or treated by ligature, cautery, or clamp. This method is good when the tumour is irremovable by adhesions.

OVARIOTOMY WHEN PREGNANCY IS PRESENT.

Although pregnancy co-exists with a large ovarian tumour, ovariotomy should still be performed. In the paper of Spencer Wells quoted he gives a table of nine cases where the pregnancy varied from the third to the seventh month, with the following results. Only one mother died: the pregnancy went on to full time in five of the cases; in three the child was expelled prematurely, and in one the child was removed at the same time. The question of the treatment of a labour complicated with an ovarian tumour concerns the obstetrician rather than the gynecologist.

CONTRA-INDICATIONS TO OVARIOTOMY.

These are, universal adhesions and malignant disease. Ordinary ascites, kidney disease or heart disease, are not contra-indications unless far advanced. Prognosis should be careful in these cases.

COURSE AND RESULTS OF OVARIAN TUMOURS WHEN LEFT ALONE.

Adhesions may be set up as the result of chronic peritonitis arising from pressure or tapping. Occasionally the cyst bursts, and in the case of the ordinary ovarian tumour we may get rapid death. When parovarian tumours burst, the fluid is unirritating and is absorbed by the peritoneum, the patient thus becoming cured. Matthews Duncan and others have recorded cases of burst ovarian tumour rapidly becoming fatal.

Torsion of the pedicle to a slight extent is often noticed in ovarian tumours. When the torsion is so great as to cut off the blood supply from the cyst, we get gangrene of the tumour and in some cases very serious symptoms, *viz.*, peritonitis, vomiting and severe abdominal pains. Dr Wiltshire of London was the first to operate for this condition, and recently Lawson Tait has operated successfully in three cases. His paper should be consulted for details. It is interesting to note that the tumours so rotated are usually right-sided and not necessarily ovarian. The usual explanation of the rotation is that it is caused gradually by the fœcal contents passing down the rectum.

The course and results of ovarian tumours when left alone can fortunately not now be studied. The picture of ovarian disease running its course unchecked, so eloquently pictured by West, is happily now almost unknown.

"We have symptoms of the same kind as we see towards the close of every lingering disease, betokening the gradual failure, first of one power, then of another; the flickering of the taper, which, as all can see, must soon go out. The appetite becomes more and more capricious, and at last no ingenuity of culinary skill can tempt it, while digestion fails even more rapidly, and the wasting body tells but too plainly how the little food nourishes still less and less. The pulse grows feebler, and the strength diminishes every day, and one by one each customary exertion is abandoned. At first the efforts made for the sake of the change which the sick so crave for are given up; then those for cleanliness; and lastly, those for comfort—till at length one position is maintained all day long in spite of the cracking of the tender skin, it sufficing for the patient that respiration can go on quietly, and she can suffer undisturbed. Weariness drives away sleep, or sleep brings no refreshing. The mind alone, amid the general decay, remains undisturbed; but it is not cheered by those illusory hopes which gild, though with a false brightness, the decline of the consumptive; for step by step death is felt to be advancing; the patient watches his approach as keenly as we, often with acuter perception of his nearness. We come to the sick chamber day by day to be idle spectators of a sad ceremony, and leave it humbled by the consciousness of the narrow limits which circumscribe the resources of our art." (Quoted by Spencer Wells).

At present, ovariotomy is one of the most successful of operations. Most ovariotomists have now a mortality of about 13 to 15 per cent., while in the hands of Keith of Edinburgh, it has sunk to 10 per cent. Keith indeed has had 76 consecutive cases without a death.

SECTION V.

AFFECTIONS OF THE UTERUS.

THERE are three periods during which morbid conditions of the uterus arise.

1. The period of evolution or development—from the ovum up to puberty. During this stage they appear as anomalies in development in utero or during childhood. They produce no marked symptoms, but a recognition of their existence is important as regards the future history of the patient.

2. The period of physiological activity—from puberty to the menopause. During this stage there occur in the uterus the morbid processes of acute and chronic inflammation, and of new formation or tumour growth; on account of its mobility, the uterus is also liable to various forms of displacement. These pathological processes give rise to symptoms of themselves, and also from their effect on the normal functions of the uterus—menstruation, conception, and pregnancy. During parturition the cervix uteri is frequently lacerated, and this constitutes an important pathological condition.

3. The period of senile involution or retrogressive development—from the menopause to death. The term involution is generally used in the restricted sense of the process which occurs after childbirth, but it is the only one which conveniently expresses the retrogressive changes after physiological activity has ceased. During this stage, the most important pathological process is that of malignant new formation.

Accordingly this section of the subject falls into chapters as follows:—

CHAPTER XXIII. Malformations of the Uterus.
,, XXIV. Atresia and Stenosis of the Cervix Uteri.
,, XXV. Atrophy of the Cervix and Uterus: Superinvolution.
,, XXVI. Hypertrophy of the Cervix: Amputation.
,, XXVII. Laceration of the Cervix.
,, XXVIII. Chronic Cervical Catarrh.
,, XXIX. Endometritis.
,, XXX. Metritis, Acute and Chronic: Subinvolution.
,, XXXI. Displacements of the Uterus: Anteflexion; Anteversion; Retroversion; Retroflexion.
,, XXXII. Inversion of the Uterus.
,, XXXIII. Fibroid Tumour of the Uterus: Pathology and Etiology.
,, XXXIV. Fibroid Tumour of the Uterus: Symptoms and Diagnosis.
,, XXXV. Fibroid Tumour of the Uterus: Treatment.
,, XXXVI. Fibrocystic Tumour of the Uterus.
,, XXXVII. Polypi of the Uterus.
,, XXXVIII. Carcinoma Uteri (of Cervix): Pathology and Etiology.
,, XXXIX. Carcinoma Uteri (of Cervix): Symptoms and Diagnosis.
,, XL. Carcinoma Uteri (of Cervix): Treatment.
,, XLI. Carcinoma Uteri (of Body).
,, XLII. Sarcoma Uteri.

CHAPTER XXIII.

MALFORMATIONS OF THE UTERUS.

LITERATURE.

Barnes—Op. cit., p. 462. *Churchill*—Obst. Journal of Great Britain, 1873, p. 256. *Kussmaul*—Von dem Mangel, der Verkümmerung und Verdoppelung der Gebärmutter, etc. : Wurzburg, 1859. *Mayerhofer*—Die Entwickelungsfehler der Gebärmutter : Billroth's Handbuch für Frauenkrankheiten, Stuttgart, 1878. *Schroeder*—Op. cit., S. 33. *Simpson, A. R.*—Ed. Med. Jour., 1863, p. 957. *Turner*—Edin. Med. Jour., June 1865 and May 1866. The standard work is that of Kussmaul. The literature is given most fully by Mayerhofer.

What is usually described as 'a malformation' is really a non-formation of one part, involving a relative disproportion. Of this we have an illustration in the uterus. The one-horned uterus is not a 'malformation,' if by this term we mean that the part which is present is maldeveloped ; the condition is a result of the *non*formation of the other horn and intervening fundus. It is misleading also to speak of a 'double uterus ;' the condition thus described is really a halved uterus, in which the halves have not united into the whole. The word, as used, therefore means an incomplete *result* not a defective process. *Mal*development is a contradiction in terms, there can only be *arrested* developments.

Malformations must be studied in connection with the normal development of the organ. In this way, they become at once intelligible. There are two processes in the progression of an organ to its mature form — *development* and *growth*. There are therefore two causes which together operate in producing malformations—arrested development and arrested growth. The period of development of the uterus, by which we mean formation of parts, extends up to the twentieth week ; the period of growth is much longer, and extends to the twentieth year (Arnold).

The student should not pass over this section of the subject as of little importance. To the practical man, malformations seem of little value because he has no power of modifying the result. To the scientific man they are, however, of the greatest interest as furnishing him with permanent impressions of the transient states of development; they are development caught in the act and fixed permanently for after-investigation. In this chapter we recommend the student to read Etiology before Pathology.

PATHOLOGY.

Complete absence of the uterus is an extremely rare occurrence and cannot be demonstrated except on post mortem examination. It has been described only in cases of fœtal monstrosities. A *rudimentary condition* sometimes occurs; in this the uterus is represented by a band of muscular fibre and connective tissue on the posterior wall of the bladder (fig. 137), and the peritoneum forms a single pouch between the bladder and the rectum (fig. 138).

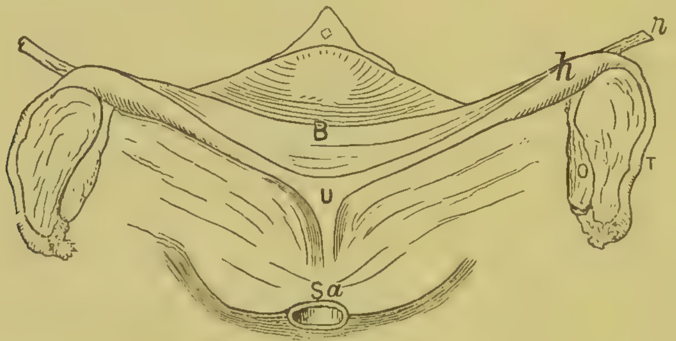


Fig. 137.

Rudimentary Uterus (Veit). *Sa* Sacrum; *U* Solid Rudiment of Uterus; *h* Rudimentary Horn *B* Bladder; *O* Ovary; *T* Fallopian Tube; *r* Round Ligament.

In the *uterus bipartitus* (fig. 139), rudimentary horns are present and are solid or hollow. The cervix is represented by a fibrous band which connects the horns with one another and with a rudimentary vagina. The ovaries are sometimes well developed so that ovulation takes place. The breasts and external genitals may be fully formed.

The uterus unicornis (fig. 140) may exist with or without a rudimentary second horn. The vaginal portion of the cervix is small; the palmæ plicatæ within the cervical canal are most marked towards the non-developed side. The body of the uterus is of disproportionate length and curves towards one side. The fundus, by which we understand the fully developed horn, is small and tapering; it has only one

Fallopian tube and ovary connected with it. On the convex side of the somewhat curved body, is the representative of the other horn which is either solid or hollow; it is connected with the developed one by fibrous tissue which may or may not form a pervious canal. Connected with this rudimentary horn are the Fallopian tube and ovary of the same side which are sometimes perfectly developed. In examining preparations of this and other uterine malformations, it is sometimes difficult to determine what is rudimentary horn and what is Fallopian tube. Here development furnishes us with a guide. The insertion of the round ligament indicates the point up to which the ducts of Müller are to be formed first into uterine horn and then into fundus uteri. Accordingly, on examining such preparations we determine the point of *attachment of the round ligament;* all below this is uterine horn, all

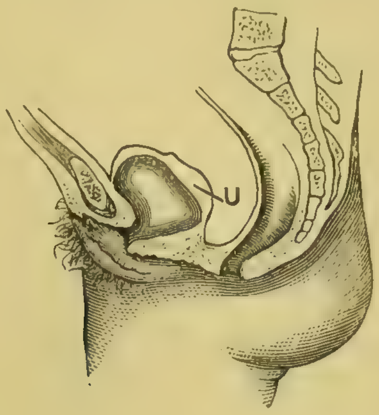


Fig. 138.

The same in its relation to the Pelvic Organs. *U* Rudiment of Uterus on the posterior wall of Bladder. The Peritoneum forms one pouch between Bladder and Rectum (Schroeder).

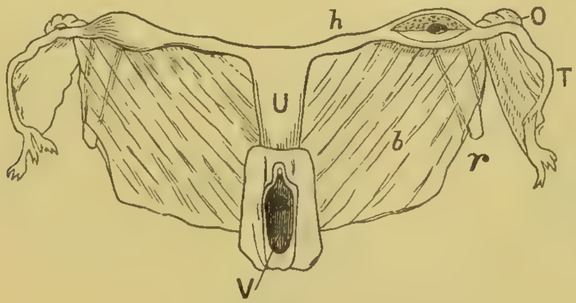


Fig. 139.

Uterus bipartitus (Rokitansky). *V* Vagina; *U* Uterus; *h* Rudimentary Horn; *O* Ovary *T* Tube; *r* Round Ligament; *b* Broad Ligament.

above it is Fallopian tube. Associated with this malformation we sometimes find absence or rudimentary condition of the kidney of the same side, since the development of the renal is closely connected with that of the generative system.

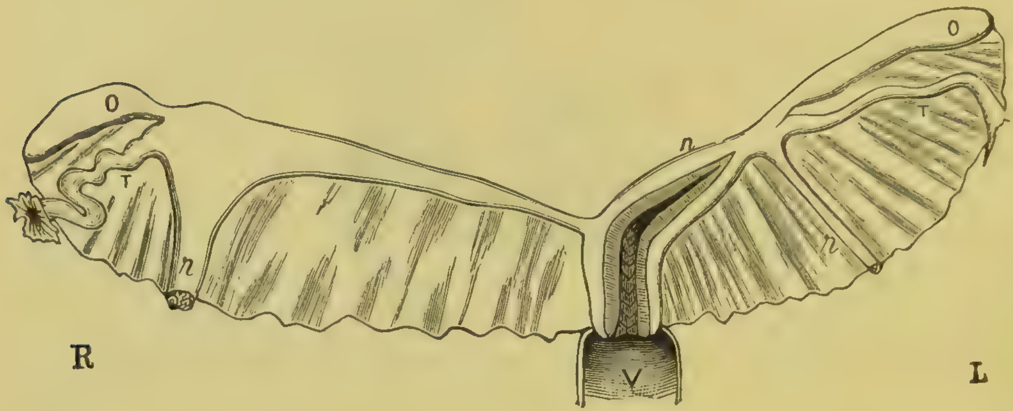


Fig. 140.

Uterus Unicornis (Schroeder). *R* Right side; *L* Left side. The left horn (*h*) is well developed and communicates with the Uterine Cavity. The right horn is in the form of an elongated band; its point of connection with the Fallopian tube is indicated by the insertion of the round ligament which is hypertrophied. Other letters as in preceding diagrams.

In the *uterus didelphys* the two halves of the uterus remain separate throughout their course. It is a very rare condition in the living adult female, and has been usually described in fœtal monstrosities. The vagina may be absent, single, or double.

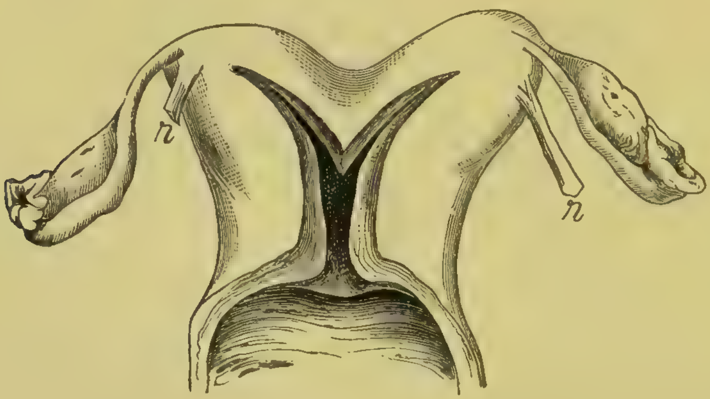


Fig. 141.

Uterus Bicornis Unicollis (Schroeder). *r* Round Ligament.

By *uterus bicornis* we understand that the separation into two horns is distinctly visible *externally*. Of this there are various degrees, from a mere depression at the middle of the fundus to a well marked bifurcation which rarely extends lower than the os internum; the farther down the separation extends, the more obtuse is the angle between the divergent horns. In addition to this external division, the separation is usually carried farther down by an internal septum which may extend to the os externum.

In the *uterus septus* (fig. 142) there is no external indication of the internal division. The uterus is divided by a septum beginning at the fundus uteri and extending downwards for varying distances, sometimes as far as the os externum. It is otherwise normal.

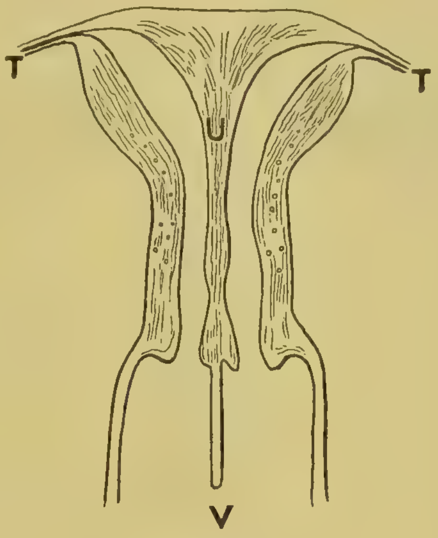


Fig. 142.

Uterus Septus in vertical transverse section (Kussmaul). *U* (Uterus) placed on septum which divides Cavity into two lateral portions; *T* Fallopian Tubes; *V* Vagina divided into lateral cavities by prolongation of septum downwards.

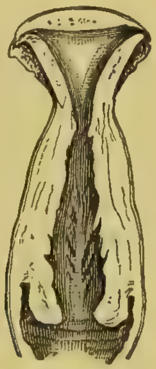


Fig. 143.

Infantile Uterus (Schroeder).

The *infantile uterus* (fig. 143) is characterised by shortness of body and disproportionate length of cervix; in fact the relative lengths of body and cervix remain the same as at birth, from which the name '*infantile*' is derived. The cervix (1½ inches long) is two or even three times the length of the body (½ inch to ¾ inch). The whole uterus is smaller than the normal. The walls (specially those of the body) are thin and the cavity is small.

The term *congenital atrophy* is applied to cases in which the proportions of body and cervix are of the normal *virgin* type, while the organ as a whole is atrophied (fig. 144). An excess of connective tissue is present in the walls, which makes their consistence firmer. This malformation occurs in scrofulous and chlorotic patients, and is often associated with hysteria and epilepsy.

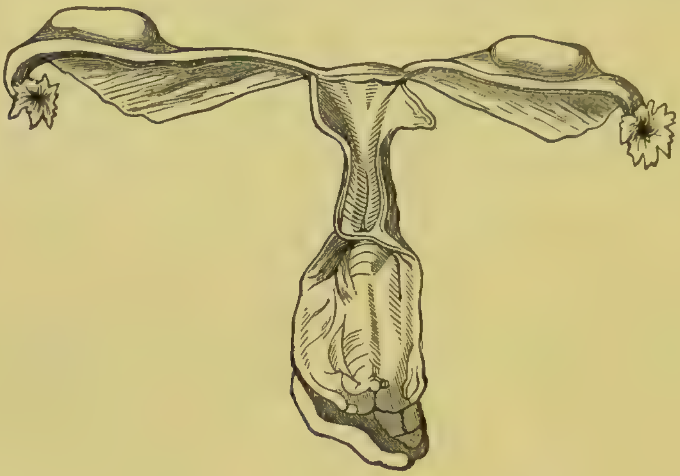


Fig. 144.
Primary atrophy of the Uterus (Virchow).

ETIOLOGY AND CLASSIFICATION.

Malformations differ according to the period at which development and growth are arrested, and the extent to which they are interfered with. There are five periods in development and growth (Fürst), which can be easily remembered when we bear in mind the division of the period of intra-uterine life into ten *lunar months.* In the first period, which extends over the *first* and *second* lunar months (from fertilization to the eighth week), the septum between the adjacent ducts of Müller is as yet unbroken. By the end of the second period, which corresponds to the *third* month (*i.e.*, eighth to twelfth week), the septum has entirely disappeared; but the upper portions of the ducts remain distinctly separate, forming the horns of the uterus and the Fallopian tubes. During the third period, *fourth* and *fifth* months, the angle between the uterine horns disappears so that the base of the uterus becomes flat. In the fourth period, *last five months*, the flattened end of the uterus, between the Fallopian tubes, becomes arched through the development of the fundus. The fifth period extends from *birth to puberty*. During this period no important change takes place till, at puberty, the uterus passes from the infantile to the virgin form. It does not, however, cease to grow till the twentieth year.

We are not yet in a position to refer each malformation in detail to its proper period; but the more perfectly we are able to do this the more satisfactory will our classification be. At present we separate the first four periods from the fifth, and speak of the period of fœtal life in contradistinction to the period of childhood. This forms the basis of our classification.

1. MALFORMATIONS ARISING DURING FŒTAL LIFE. Of these there are the following:—*complete absence* or *rudimentary condition* of the uterus; the *uterus bipartitus*, produced by a development of only the upper parts of the ducts of Müller into rudimentary horns of the uterus and Fallopian tubes; the *uterus unicornis*, due to the development of only one duct; the *uterus didelphys*, due to the development of the ducts separately, without coalescence; the *uterus bicornis*, in which the ducts coalesce below, and the horns remain un-united by a fundus above; the *uterus septus*, in which the coalescence of the ducts and development of the fundus take place, so that the uterus appears normal externally while internally the septum has persisted.

2. MALFORMATIONS ARISING DURING CHILDHOOD. Of these there are the following:—the *uterus infantilis*, in which the uterus does not undergo the development which should take place at puberty but remains of the same type as it was at birth; *congenital atrophy* of the uterus, in which it assumes the virgin type but the organ as a whole is atrophied.

SYMPTOMS.

The symptoms of malformation consist in an *impairment of function*, and hence do not appear until puberty.

In the external appearance of the patient there is not necessarily anything to attract attention. The figure, features, temperament and voice are of the feminine type, even though the uterus is not developed. The mammæ may be fully formed. The development of the external genitals is independent of the development of the internal organs.

Complete absence and rudimentary condition of the uterus may give rise to no local symptoms, except the non-appearance of menstruation. If the ovaries are developed, ovulation with associated monthly disturbance is present and the accumulation of menstrual blood in a rudimentary horn may call for operative measures to form a channel for its escape. Even on entering married life the condition need not necessarily attract attention ; if the vagina be not well developed, the urethra becomes dilated so as to take its place.

In the uterus unicornis, menstruation, conception and pregnancy may go on undisturbed in the developed horn. It is the *imperfectly developed horn which gives rise to symptoms*—the result of the retention of menstrual blood and of the products of conception. If the mucous membrane of this horn discharge blood periodically and there be no communication with the uterus to allow of escape, the blood collects and produces a distended sac. It is of great interest to note that we may have a fertilised ovum growing in the isolated horn ; we have not space here to discuss how this interesting condition is produced (fig. 145). Uterus bicornis and uterus septus produce no symptoms, unless one half of the septate uterus does not open into the cervical canal—in which case hæmatometra occurs at puberty (v. Chap. XLIII.). The statement that the patient menstruates regularly throws the practitioner off his guard. He should remember that the menstrual blood *may flow undisturbed from one half of the uterus while it is accumulating in the other.* In both of these forms we have two possible seats for a growing ovum (fig. 146), and thus we can explain some cases of superfœtation ; after a fœtus has begun to develope in one half of the uterus, a second ovum becomes fertilised in the other and reaches maturity at a later period than the first. We may thus also explain some cases in which menstruation occurs during the early months of gestation.

The uterus infantilis and the congenitally small uterus are characterised by the absence of menstruation and the constitutional nervous disturbance which is usually associated with them.

DIAGNOSIS.

Complete absence of the uterus cannot be diagnosed with certainty in the living subject. A rudimentary condition may be present, and yet not be detected on the most careful examination. To examine cases in which this condition is suspected, we first pass a sound into the bladder and then with one or two fingers of the right hand in the rectum palpate the tissues which lie between the sound and the fingers.

It is evident that in such a condition as is represented in fig. 138 the rudiment of the uterus may escape observation, or be considered as a thickening of the posterior wall of the bladder. We now remove the sound from the bladder, as it only reaches to a limited height in the pelvis, and with the left hand on the abdomen make a careful recto-

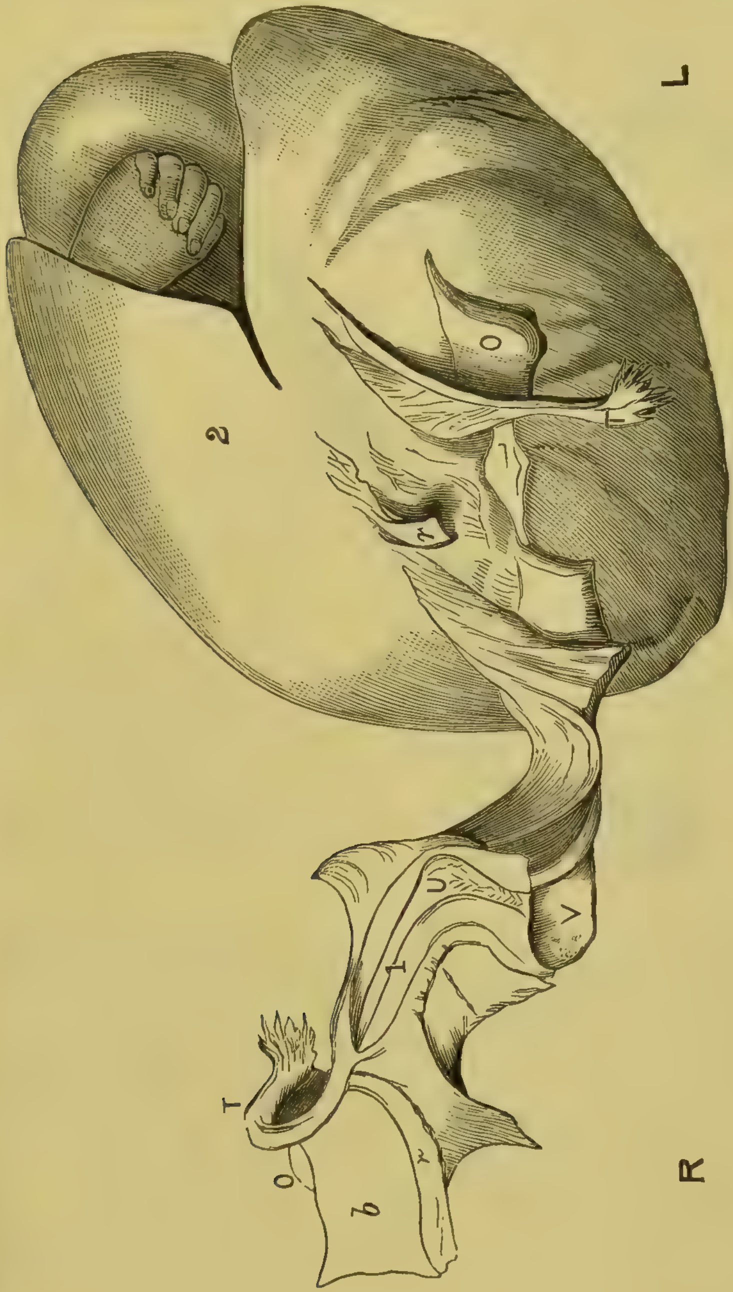


Fig. 145.

One-horned Uterus with fœtation in the detached left horn (Turner). The right horn (1) has its ovary (*O*), Tube (*T*), Round (*r*), and Broad (*b*) Ligaments in normal relation to it. The gestation sac (2) is on the proximal side of the left round ligament (*r*) and consists therefore of the left horn; this does not communicate with the Uterine Cavity (*U*). The left Ovary (*O*) and Tube (*T*) are attached near the Round Ligament (*r*).

abdominal examination. To do this last satisfactorily, we anæsthise the patient. If we feel two bodies laterally without any distinct body between, it is impossible to say whether these are rudimentary horns or ovaries.

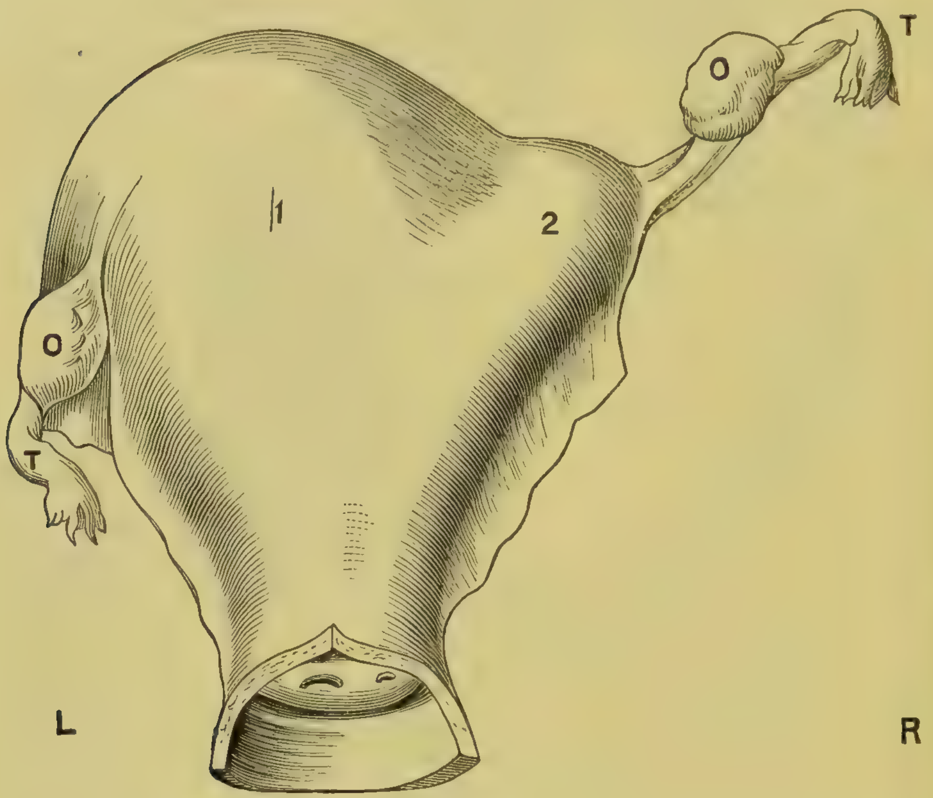


Fig. 146.

Uterus septus (posterior view) from a woman who died in the puerperium (Cruveilhier). The Uterine Cavity is divided by a septum which extends to the os externum. The left half (1) is strongly developed and contained the fœtus. The right half (2) was empty.

The diagnosis of the one-horned uterus is not easy. The points to rely on are the following : the fundus turns to one side of the pelvis, is tapering, and has only one ovary connected with it. The rudimentary horn and the other ovary lie removed from it.

The uterus didelphys is extremely rare. A groove on the external surface of the uterus separating it into lateral halves, so that sounds could be passed into the separate cavities without coming in contact, indicates this condition.

The uterus bicornis is a comparatively frequent condition and if well marked is easily recognised. Unusual breadth of the fundus with a slight depression in the centre, points to a minor degree of this deformity.

The uterus septus is easily diagnosed if the septum extend as far as the os externum, so as to be within reach of the examining finger. If the septum does not extend so far, the condition may not be detected as there is no change in the external form to direct attention to the internal malformation. The sound may pass with equal ease into either cavity or always into the same, and thus furnish no indication. In a case that came under our own observation the patient was examined frequently during life, bimanually and with the sound, and the uterus pronounced normal. At the post-mortem, the external appearance of the uterus was normal; it was only on cutting into it that it was observed that the cavity was divided into two portions by a septum which extended to the os internum.

The uterus infantilis and the congenitally atrophic uterus are recognised by the smallness of the uterus. This is most distinctly made out with the finger in the rectum, the uterus being at the same time drawn down and fixed with the volsella. The well developed vaginal portion and the unusual length of the cervix as felt per rectum enable us to diagnose the infantile from the congenitally small uterus.

PROGNOSIS.

In prognosis we must keep in view the possibility of ovulation with menstrual molimina, the secretion of menstrual blood and its accumulation in a closed cavity, the probability of conception and of gestation in an isolated horn. The most difficult cases are those in which the practitioner has to decide whether marriage is justifiable or not.

TREATMENT.

Malformations of the uterus lie beyond the range of treatment, except when they give rise to retention of menstrual blood or of the products of conception. The treatment of these conditions will be considered under Atresia of the Vagina (see Section VI.), and Extra-uterine Gestation (see Section IX.).

CHAPTER XXIV.

ATRESIA AND STENOSIS OF THE CERVIX UTERI.

LITERATURE.

Barnes—Op. cit., p. 245. *Greenhalgh*—British Med. Jour., June 1878. *Mackintosh*—Practice of Physic: London, 1836, p. 481. *Schrœder*—Op. cit., S. 64. *Schultze*—Ueber Indication und Methode der Dilatation des Uterus: Wiener med. Blätter, 1879, Nos. 42, 43, 44, 45. *Simpson, Sir J. Y.*—Op. cit., p. 245. *Sims, Marion*—On the Surgical Treatment of Stenosis of the Cervix Uteri: Am. Gyn. Trans., 1878, p. 54. *Smith, H.*—Obst. Jour., London, Vol. V., p. 256. *Thomas*—Op. cit., p. 613.

Definition.—Atresia (*α-τρῆσις*, non-perforation) is an occlusion of the canal. Stenosis is a concentric contraction of its lumen.

ATRESIA OF THE CERVIX.

ETIOLOGY AND PATHOLOGY.

Atresia is rare as a *congenital* condition; this is due to the presence of a cap of tissue covering the os uteri. An imperforate condition of the canal throughout its course is seldom, if ever, found.

It is more frequently *acquired*, and results from the following causes:—

Sloughing and cicatrisation after labour;

Cicatrisation after the application of caustics, and after amputation of the cervix;

Adhesion of granulations in cervical catarrh (after menopause), and round the base of tumours.

The practical point for the practitioner to remember is that atresia may follow the repeated application of caustics and amputation of the cervix. It occurs also as part of the physiological changes which take place after the menopause. Twenty-eight per cent. of women above fifty years of age have atresia of the cervix (Hennig).

Atresia of the cervix is chiefly of importance in regard to the accumulation of menstrual blood or mucus above the obstruction. It is this which produces the Symptoms and calls for Treatment. It will be better to defer the consideration of these till we treat of Atresia Vaginæ (Section VI.).

STENOSIS OF THE CERVIX.

This condition is described in English and American text-books under "Obstructive Dysmenorrhœa." Dysmenorrhœa is however a symptom common to this and many other pathological conditions, each of which is considered under the organ in which it occurs. Stenosis of the os externum is a precise pathological condition which requires a definite line of treatment.

PATHOLOGY.

The common seat of the stenosis is at the *os externum.* It is a disputed point whether there is ever stenosis (as we have defined it) at the os internum. Barnes says that when he has found the obstruction at the os internum it was almost always due to flexion of the uterus. The obstruction is, in such a case, not a true stenosis; it might be compared to the kink produced on a gutta-percha tube when it is bent. Spasmodic contraction of the muscular fibres surrounding the os internum, taking place at the menstrual period, is adduced by some to explain the symptoms of dysmenorrhœa.

In the congenital variety, the cervix is conical in form (fig. 147) and of unusually firm consistence. Sometimes it is hypertrophied, the vaginal portion measuring as much as two inches (Barnes). The os is small, and appears as a pin-hole on the extremity of the cervix. The contrast between this and the normal os is well seen in fig. 149. The cervical canal above the obstruction is often dilated into a spindle-shaped cavity (fig. 148).

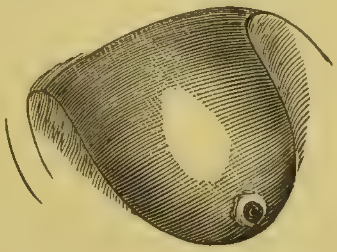


Fig. 147.
Conical Vaginal Portion (Barnes).

ETIOLOGY.

Like atresia, stenosis of the cervix is congenital or acquired. The commonest causes of the acquired form are cicatrisation after labour, after amputation of the cervix, and after the repeated application of strong caustics ; the last is perhaps the most frequent cause. Inflammation of the mucous membrane, resulting in adhesions, also produces it.

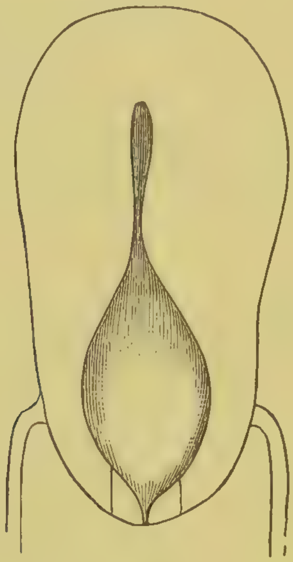


Fig. 148.

Stenosis of Os Externum, with Dilated Cervical Canal (Mundé). The parallel lines beside the os show the extent of the bilateral incision.

SYMPTOMS.

The symptoms primarily produced by the stenosis are *dysmenorrhœa*, *sterility*, *dyspareunia*. In addition, there is in some cases *menorrhagia*. If the condition exist for a time, pelvic peritonitis or ovaritis may complicate the case.

The cause of the dysmenorrhœa is evident. The menstrual blood is poured into the cavity of the uterus, the contracted condition of the outlet prevents its escape, it coagulates, the coagula excite uterine contractions which are accompanied with pain. Hence the menstrual blood is usually discharged as clots. In the first instance, the simple mechanical obstruction is the cause of the dysmenorrhœa. Other pathological conditions, as endometritis and metritis, arise secondarily ; and the monthly congestion of the tissues, thus diseased, will also produce pain. We shall refer to this subject again under Anteflexion of the Uterus.

The association of sterility with a conical cervix and pin-hole os has been for a long time recognised. We are not able to explain why a narrow os should lessen the probabilities of fertilisation, yet it is a well observed fact that it does so.

Sterility due to this cause is amenable to treatment, and presents the most satisfactory cases which the practitioner has to deal with, as by the simple operation to be presently described he may remove the great opprobrium of married life.

DIAGNOSIS.

The history of dysmenorrhœa and sterility may have already led us to suspect this condition; but since these symptoms as frequently accompany anteflexion, we have recourse to the physical examination.

The conical cervix projecting markedly into the vagina attracts attention. On feeling for the os uteri, the first impression is that it is absent; more careful examination detects a slight depression.

The speculum shows the appearance represented in fig. 149. The normal os uteri is placed alongside, to be compared with it.

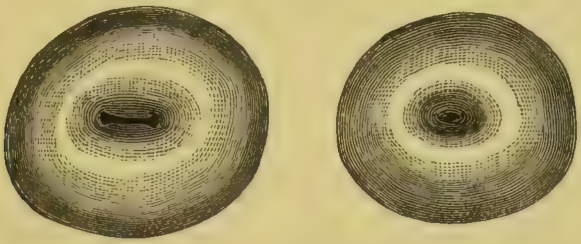


Fig. 149.

Normal and Pin-hole Os, as seen in the Speculum (Schrœder).

The sound is passed with difficulty; sometimes a surgical probe is all that the orifice will admit. After it has passed the os externum, the instrument may enter a dilated cervix (fig. 148).

PROGNOSIS.

This will depend on (1) the existence of stenosis of the os externum uncomplicated by anteflexion, (2) the absence of pelvic peritonitis and ovaritis. If these conditions are fulfilled, the prognosis is favourable as regards the cure of the dysmenhorrœa and probably so as regards the cure of the sterility. As regards the latter, however, we must remember that there are many other causes which may be operative and may escape detection. All that we can say to the patient is, that by operative procedure we can *increase the probability* of the occurrence of pregnancy.

TREATMENT.

The methods of treatment are—

A. Dilatation,
B. Division.

Dilatation of the stenosis is carried out by passing graduated bougies, by sponge or laminaria tents, by forcible dilatation with instruments. Division is effected by the metrotome or by scissors.

A. Dilatation.

Dilatation by means of *graduated bougies* was brought into prominent notice by Dr Macintosh who employed straight metallic bougies of different degrees of thickness. He passed first a small one not thicker than a probe, and then larger ones till the os was rendered quite patulous.

Sponge and laminaria tents have also been largely used. The objection to them, as well as to the dilatation with graduated bougies, is that the cure is only temporary. With a laminaria tent we may dilate the stenosis so that the finger easily passes it, but in a few days it will have contracted to its original size. The use of tents is also attended with the risks of cellulitis, peritonitis, and even septicœmia (see p. 128).

Forcible dilatation is effected by Schultze of Jena with the dilator represented at fig. 150. He dilates the cervical canal beforehand with laminaria; he then washes it out with a 2 per cent. solution of carbolic acid, as he attributes many of the serious consequences of forcible dilatation and incision to the absorption of the secretions. The dilator is now introduced, and the blades (which open antero-posteriorly) are forcibly separated. We have had no experience of this method of treating stenosis.

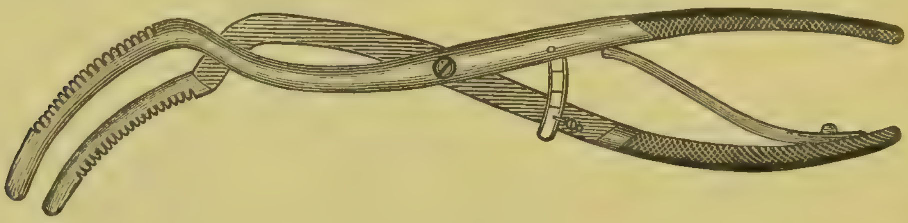


Fig. 150.
Schultze's Dilator.

The dilator employed by Marion Sims is seen at fig. 151.

B. Division.

Division of the cervix with the knife was introduced by Sir James Simpson. The instrument which he devised for this purpose was the *metrotome* represented at fig. 152.

It is a bistoury caché, with a single blade sharp on the outer edge which is unsheathed on compressing the handle. The screw on the handle regulates the extent to which the blade is to be protruded. The instrument was passed in till the point almost reached the os internum; it was turned with the blade to one side, and then withdrawn, the handle being at the same time more and more compressed. The result was a lateral incision in the cervix, superficial at its upper extremity but becoming deeper as it passed downwards till at its base it completely divided the intra-vaginal portion. The instrument was re-introduced and a similar incision made on the opposite side. The extent of this bilateral incision is seen in fig. 153. The result of this operation is that the narrow circular os becomes an orifice with gaping lips.

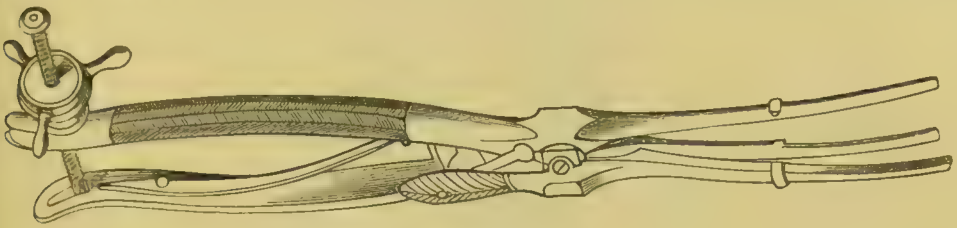


Fig. 151.
Marion Sims' Dilator (Sims).

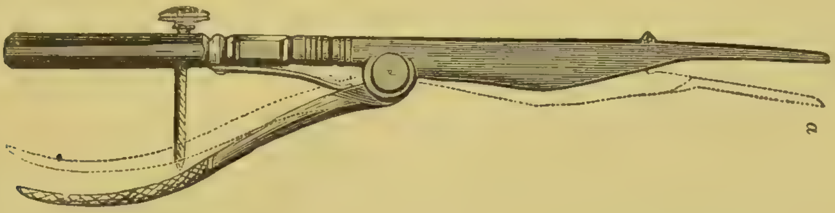


Fig. 152.
Sir James Simpson's Metrotome (Sir J. Y. Simpson). *a* shows position of blade when protruded

By effecting this change in the form of the os uteri, we not only remove the obstruction to the outflow of the menstrual blood but also favour the entrance of the spermatozoa into the cervical canal. As Sir J. Y. Simpson points out, we make the nulliparous os resemble in form the os of a uterus which has been pregnant; that is, instead of being circular and small, it is made transverse and gaping (cf. figs. 154 and 155). That a patulous condition of the os and cervical canal greatly favours fertilisation is proved by the readiness with which conception follows abortion.

Other forms of metrotome have been introduced by Coghill, Greenhalgh, Savage, and Routh. Those of Greenhalgh and Savage are double-bladed, while that of Routh has the blades curved.

We are indebted to Marion Sims for substituting the *scissors* for the metrotome. The objections to the latter instrument are that we do not know how deep the incision is being made, nor whether both incisions are being made equally. The practitioner will find the scissors easier to handle than the knife. A pair of ordinary strong scissors will do, provided they are sharp and the cervix be firmly held with the volsella.

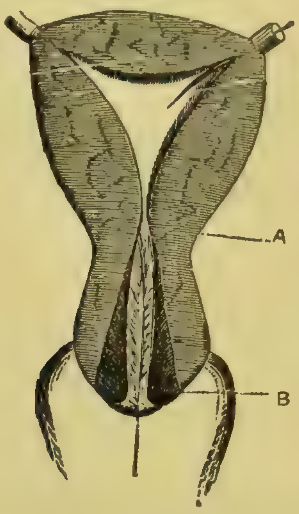


Fig. 153.

Incision made by Metrotome (Sir J. Y. Simpson). The dark-shaded portion B represents extent of incision, A os internum.

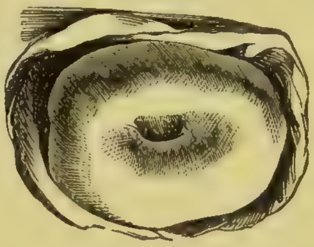


Fig. 154.

Nulliparous Os Uteri (Sir J. Y. Simpson).

The scissors of Kuchenmeister (fig. 110) and Hart (fig. 111) have this advantage, that the hook on the external blade prevents the cervix from slipping out as the section is being made.

The operation is performed as follows :—The patient is placed semi-prone. The Sims' speculum is passed and held by an assistant; if Battey's speculum is used, an assistant is not necessary. We recommend that this operation, as indeed all operations on the cervix or vagina, be performed under continual irrigation from a vaginal douche. It is difficult to do this in private practice and without assistants ; but, if always carried out, the possibility of cellulitis and peritonitis is reduced to a minimum. If the irrigation be not employed, the vagina should be thoroughly syringed beforehand with 1 to 40 carbolic acid solution.

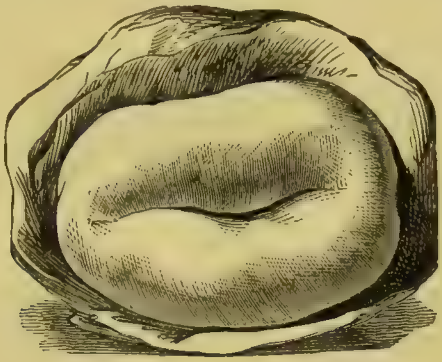


Fig. 155.

Parous Os Uteri (Sir J. Y. Simpson).

The anterior lip of the cervix is laid hold of with the volsella; the scissors are introduced, the straight blade being passed within the cervical canal; the point or hook of the external blade is carried to about half-way up the cervix (see fig. 156 and fig. 148) and the section made. In many cases, all that is necessary is to divide the ring round the os externum; when this is divided, we find the cervical canal dilated above it. In this respect this operation differs from that of dividing the posterior lip (see under Anteflexion), in which it is essential to make the scissors cut as far as the reflection of the mucous membrane at the fornix. Should the cervical canal not be patulous, it may be necessary to make the incisions extend deeper—to the base of the vaginal portion. There is generally not much bleeding after the section is completed, but we watch a few minutes to see. If there is none, a vaginal tampon is not required. Should hæmorrhage occur, some perchloride of iron is swabbed on the cut surface and a vaginal tampon of lint soaked in carbolised oil is applied.

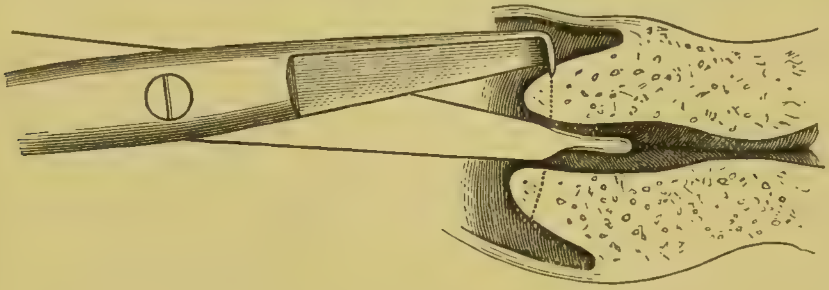


Fig. 156.

Showing the Bilateral Division of the Cervix, with Kuchenmeister's Scissors (Barnes).

More important than the incision is the after-treatment. The patient must be seen on the following day, and every second day for a fortnight, and the finger passed in on each occasion to prevent union of the cut surfaces and dilate the cervical canal. To keep the canal open, Thomas recommends the use of a glass cervical plug (fig. 157), kept in position by a solid plate of the form of an Albert Smith pessary. This is useful after division of the posterior lip, but we think that it is not necessary after the bilateral incision.

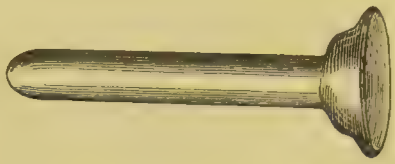


Fig. 157.

Glass Plug to keep the Cervix Patulous after division (Thomas).

CHAPTER XXV.

ATROPHY OF THE CERVIX AND UTERUS: SUPERINVOLUTION.

We meet with an atrophic condition of the cervix and uterus under four different conditions :—

1. As a congenital condition ;
2. Associated with certain constitutional affections, as phthisis, scrofula, chlorosis ;
3. In the puerperal uterus, as the result of superinvolution ;
4. After the menopause.

Should the student find on vaginal examination that the cervix is small and projecting only slightly into the vagina, and on bimanual examination that the body of the uterus is found with difficulty and is smaller than it should be, he must next ascertain which of the above-mentioned causes has produced the atrophy.

The history will enable him to form his diagnosis. With the *congenital condition* there is a history of amenorrhœa or scanty menstruation since puberty, of sterility if the patient has entered married life, and of hysteria and other disturbances of the nervous system which usually accompany imperfect development of the uterus. The *constitutional condition*, and especially the state of the blood and of the lungs, in other cases enables him to account for the condition of the uterus. Probably the small uterus found in chlorotic patients is a congenital condition, and not secondary to the constitutional state. If the atrophic condition be the result of *superinvolution*, there is a history of childbirth with non-appearance of menstruation after it. With regard to the *menopause*, the age of the patient is the chief guide ; we must remember the possibility of an early menopause, as early as at the age of thirty-five.

The only atrophic condition which we shall consider here is that occurring in the puerperal uterus as the result of superinvolution. To Sir James Simpson's description of this condition we are chiefly indebted.

SUPERINVOLUTION OF THE UTERUS.

LITERATURE. *Frommel*—Ueber puerperale Atrophie des Uterus: Zeits. f. Geburts. und Gynäk., Bd. vii., H. ii., S. 305. *Jaquet*—Berl. Beiträge zur Geburts. und Gynäk., Bd. ii., S. 3. *Klob*—Patholog. Anatom. der weib. Sexualorgane: Wien., 1864, S. 205. *Simpson, Sir J. Y.*—Med. Times and Gazette, 1861. Diseases of Women: Edin., 1872, p. 547.

PATHOLOGY.

The uterus is small. Its external length may be reduced from the normal 3 to 1¾ inches. The walls are thin and flaccid, sometimes of a dense and fibrous consistence. The vaginal portion projects only slightly into the vagina, and may be almost flush with the vaginal roof. The os may be relatively patulous, or contracted so as only to admit a probe. The uterine cavity is reduced to 2¼, 2, or even 1½ inches in length. The ovaries are atrophied, and sometimes show an increase of fibrous tissue in their structure. The accompanying specimen (fig. 158), described by Sir James Simpson, illustrates these points.

ETIOLOGY.

As to the frequency of this condition, Frommel found it present in 28 out of 3000 gynecological cases, that is in almost 1 per cent. The reason why, in certain cases, the process of involution during the puerperium goes on till the uterine cavity is reduced to less than 2½ inches in length is not known. *Protracted Lactation* seems the most important cause (Frommel). We have seen this in two cases, and Chiari has also drawn attention to it. In some instances there is a history of great *loss of blood* at the confinement; in a case of this, reported by Whitehead,* the atrophic changes had progressed so far that no trace of a uterus was found on the most careful examination. In other instances *pelvic peritonitis* has occurred during the puerperium: this can produce, we know, atrophy of the ovary through binding it down with adhesions; and atrophy of the ovaries may lead to atrophy of the uterus. It is also associated with the *tubercular diathesis* (Klob).

SYMPTOMS.

Continued amenorrhœa is the symptom which leads the patient to seek advice. After she has ceased nursing, she expects the flow to return. It does not do so, however, even after months have passed. Pain in the back, weakness and hysterical symptoms are also present.

DIAGNOSIS.

The small cervix at once suggests what the condition is. We sometimes have difficulty in making out the uterus bimanually; here the examination per rectum, combined with the volsella, is useful.

---

* British Med. Jour., Oct. 1872.

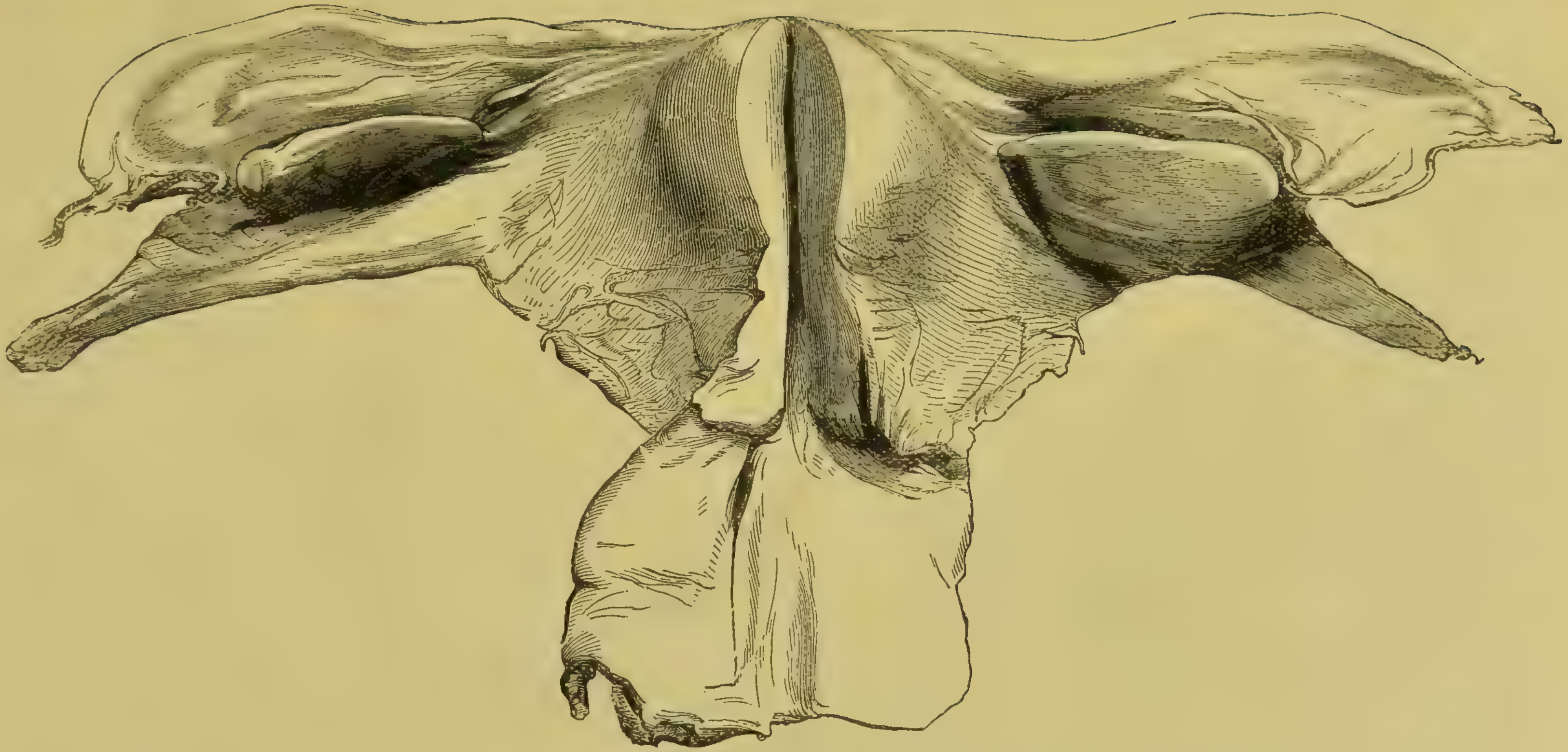


Fig. 158.

Preparation of Uterus and Ovaries in a case of Superinvolution *ad naturam.* Weight of parts represented—one ounce, four drachms, twenty five grains. Uterine cavity measures $1\frac{1}{2}$ in. Thickness of posterior uterine wall (laid open in figure) $\frac{1}{4}$ in. Tissue of uterus, dense and fibrous. Ovaries atrophied, with increase of fibrous tissue and no appearance of Graafian vesicles. (Sir J. Y. Simpson.)

The best idea of the size of the uterus is gained by pressing the ball of the finger in the rectum against the isthmus of the uterus, and then moving the uterus upwards and downwards upon the finger which can thus estimate accurately its size; having done this, we make more traction on the uterus to bring it as far down as possible, and examine the ovaries.

The sound must be used with care, as it easily perforates the thin walls of the uterus. It does not pass into the uterus as far as the $2\frac{1}{2}$ in. knob.

Differential diagnosis must be made from—

Congenital malformation;
Congenital atrophy;
Senile atrophy.

TREATMENT.

This consists in stimulating the uterus to hypertrophy by placing a foreign body in its cavity. The galvanic intra-uterine stem pessary of Sir James Simpson is the best instrument for this purpose. The stem is made in its upper half of zinc, in its lower half of copper; the bulb is also of copper. The form of it is seen in fig. 159, which is drawn full-size. The stem should always be shorter than the uterine cavity by a $\frac{1}{4}$ of an inch; otherwise it may perforate the fundus. It is introduced as follows. The cervix is laid hold of with the volsella to draw it towards the vaginal orifice and to steady it. The stem is held with the bulb between the finger and thumb, and passed into the cervix for about an inch. If the vaginal orifice be too narrow to allow of this manipulation, the bulb is fixed on the end of a staff (fig. 159) and thus carried in. Once the stem

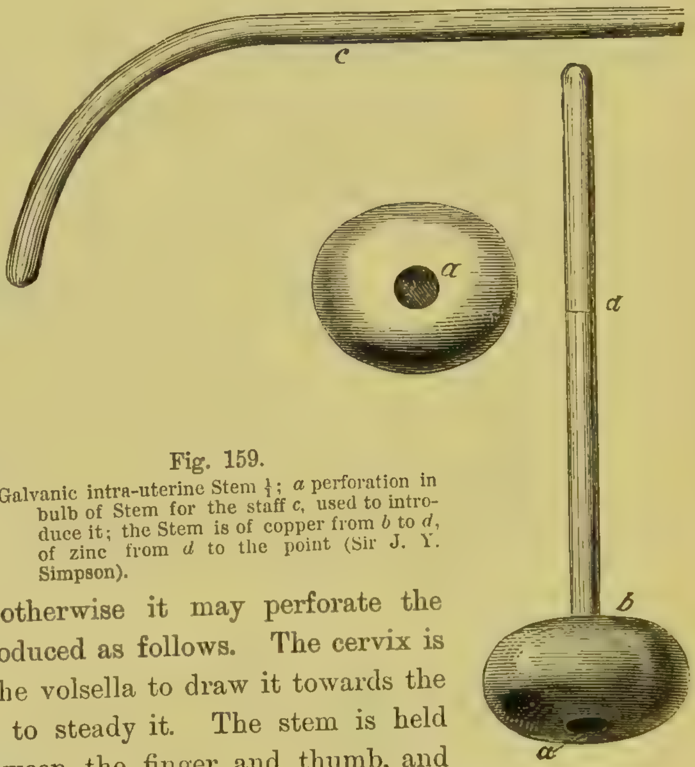


Fig. 159.

Galvanic intra-uterine Stem $\frac{1}{1}$; *a* perforation in bulb of Stem for the staff *c*, used to introduce it; the Stem is of copper from *b* to *d*, of zinc from *d* to the point (Sir J. Y. Simpson).

is within the cervix difficulty is sometimes felt in pressing it onwards. The following manœuvre facilitates this. Pass the index finger of the right hand well upwards into the rectum till the point of it gets fairly behind the cervix and fixes it; now put the thumb into the vagina, and with it make pressure on the bulb which is thus between the thumb and finger (the posterior wall of the vagina of course intervening), and the stem can be satisfactorily pushed home.

A glycerine plug is passed to keep the stem in position at first. The patient should keep at rest for one day after the stem has been introduced, and should be instructed to send at once if pain is felt in the pelvis; we have seen pelvic inflammation follow the introduction of a stem pessary. Should the practitioner not be within call, it is a good plan to tie one piece of string to the bulb and another to the plug, so that the patient can draw them out herself when symptoms of inflammation arise. The pessary can be worn for months without being removed, does not interfere with menstruation, and keeps its position without any plug in the vagina.

CHAPTER XXVI.

HYPERTROPHY OF THE CERVIX: AMPUTATION.

LITERATURE.

Byrne—Amputation and Excision of the Cervix Uteri: Trans. Americ. Gyn. Soc., Boston II. pp. 57 and 110. *Galabin*—Lond. Obst. Journ., Sept. 1878. *Goodell*—Clinical Notes on the Elongations of the Cervix Uteri: Am. Gyn. Trans., 1880, p. 268. *Hegar und Kaltenbach*—Operative Gynäkologie: Stuttgart, 1881, S. 445. *Huguier*—Memoires sur les Allongements Hypertrophiques du Col de l'Uterus, Paris, 1860. *Leblond*—Op. cit., p. 448. *Marckwald*—Ueber die kegelmantelförm. Excision der Vaginal-Portion, etc.: Archiv. f. Gyn. Bd. viii. S. 48. *Schrœder*—Charité-Annalen, 1878: and Zeitschrift für Geburt. u. Gyn., Bd. iii. S. 419; Bd. vi. Hft. 2, S. 218. *Simon*—Monatsch. f. Geburtskunde, xiii. S. 418. *Sims, Marion*—Uterine Surgery, p. 264.

HYPERTROPHY of the whole uterus occurs in two forms:—

1. Hypertrophy of the muscular tissue—in pregnancy;
2. Hypertrophy of the connective tissue—in subinvolution and chronic metritis, both of which will be considered under chronic metritis.

Hypertrophy of the cervix alone calls for special notice here.

HYPERTROPHY OF THE CERVIX.

Under this head we consider two conditions:—

A. Hypertrophy limited to the vaginal portion, which is a distinct *primary* lesion;

B. Hypertrophy of the supra-vaginal portion which is usually associated with hypertrophy of the body of the uterus, this occurs in prolapsus uteri and is probably *secondary* to that condition.

A. HYPERTROPHY OF THE VAGINAL PORTION.

Pathology.—The peculiarity of this condition is that the cervix is normal in every respect except length (fig. 161). The mucous membrane and the subjacent tissue are not thickened, so that the diameter of the cervix is not much increased. As the result of the increase in length, the conical apex of the cervix comes to lie immediately behind the hymen and may protrude through the vaginal orifice (fig. 160). The os externum is often small.

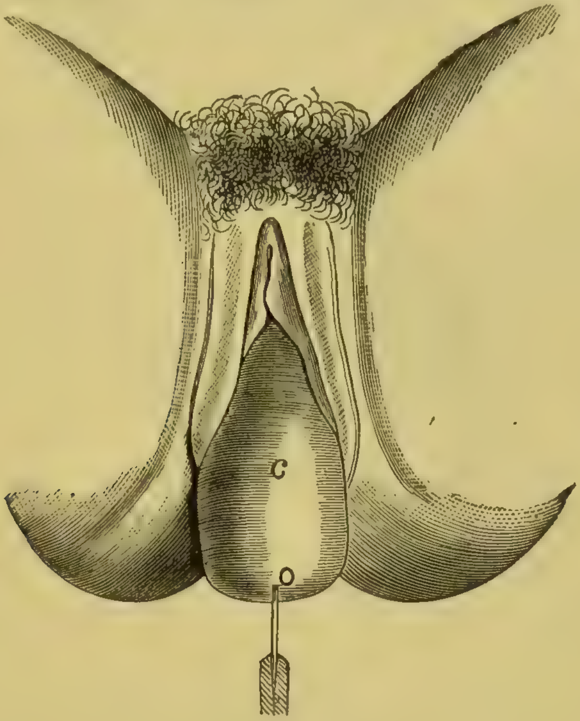


Fig. 160.
Hypertrophied vaginal portion *c* protruding through the Vulva. The Sound has passed very far into the small os *o* (Schrœder).

Etiology.—This condition is a true hypertrophic growth; it is not very common and the cause of it is unknown. As it occurs in the virgin, it is probably congenital. Sometimes it does not attract attention till the patient enters married life, when it produces as a rule sterility because the form of the cervix interferes with conception.

The cervix is frequently *thickened* as the result of chronic inflammation consequent on laceration of the cervix in child-birth; this is not a true hypertrophic growth, and will be considered under Laceration of the Cervix (chap. XXVII.).

Symptoms.—The symptoms are due to the presence of the hypertrophied cervix in the vagina. There is bearing-down as in prolapsus uteri, irritation of the mucous membrane of the vagina and consequent leucorrhœa, discomfort on walking about and on rising suddenly. If the cervix protrude beyond the vulva, ulceration of its mucous membrane and excoriation are produced.

Diagnosis.—This presents no difficulty. The fornices are found in their normal position on vaginal examination (see fig. 161), the fundus uteri at its normal height in the pelvis on bimanual examination.

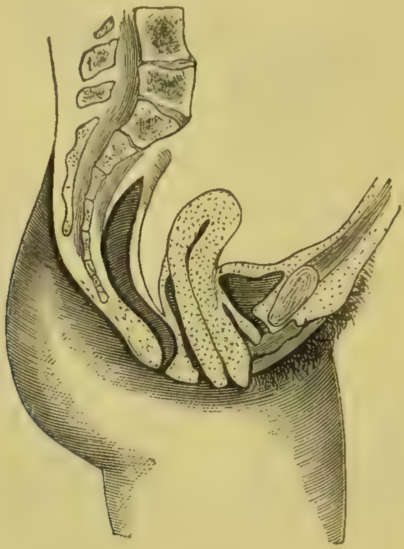


Fig. 161.

Hypertrophy of intra-vaginal portion of Cervix. Neither fornix is obliterated (Schrœder). Section of Pelvis seen in fig. 160.

These two clinical facts indicate that the low position of the apex of the cervix is not due to a descent of the fundus but to a hypertrophy of the cervix, and that the hypertrophy of the cervix is limited to the portion which projects into the vagina (*cf.* fig. 161 with fig. 169 and fig. 170). The sound will pass five inches or more into the cervical canal; as the patient is usually a nullipara and the abdominal walls therefore firm, it facilitates the bimanual to do it with the sound in the uterus. The combined recto-vaginal examination shows that the uterus, above the vagina, is of normal length.

Treatment. This consists in amputation of the cervix which is the only course open to us, because the hypertrophy will not diminish but rather increase. Amputation is performed by three methods :—

1. Scissors or knife,
2. Ecraseur,
3. Galvano-caustic wire.

The successive improvements in the method of amputation *with the knife* may be thus tabulated; by Marion Sims was made the advance of covering the stump with mucous membrane.

(1.) *Old* method. Circular amputation; raw surface touched with caustic or cautery; healing by granulation.

(2.) *Sims'* method. Circular amputation; vaginal mucous membrane stitched to vaginal mucous membrane; healing partly by first intention (fig. 162).

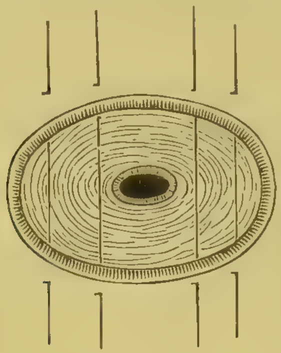


Fig. 162.

Sims' method of passing the sutures. Vaginal mucous membrane stitched to vaginal (Sims).

(3.) *Hegar's* method. Circular amputation; vaginal mucous membrane stitched to cervical mucous membrane (fig. 167); healing by first intention.

(4.) *Simon and Marckwald.* Flap amputation by wedge-shaped excision of lips separately (fig. 163); vaginal mucous membrane stitched to cervical on each lip (fig. 165); healing by first intention.

As there is often considerable hæmorrhage, it is well to place a constricting band on the cervix above the point of section. A common india-rubber umbrella ring serves admirably to control hæmorrhage in this and in Emmet's operation for lacerated cervix. The ring is warmed beforehand to make it less rigid and slipped over the handle of the volsella which grasps the cervix; after the operation is completed we notch it with the scissors, and thus gradually slacken it before finally cutting it through.

The best method of performing the amputation is to split the cervix by a transverse incision into an anterior and posterior lip; then amputate each lip separately making the line of amputation wedge-shaped; finally bring together the projecting flaps of vaginal and cervical mucous membrane with wire sutures.

The operation. The instruments required are the following :—

Antiseptic douche,
Sims' speculum,
Spatulae,
Volsella,
India-rubber ring,
Straight needles fixed on handles,
Silver wire,
Bistouries,
Dissecting forceps,
Blunt hook,
Scissors,
Artery forceps,
Small curved needles and needle holder.

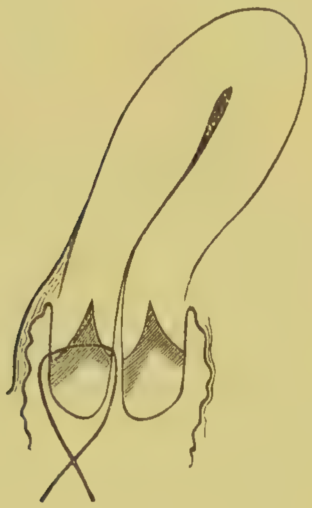


Fig. 163.

Marckwald's method of splitting the cervix into an anterior and posterior lip and then uniting cervical to vaginal mucous membrane (Schrœder).

A. R. Simpson operates as follows :—The patient is placed in the lithotomy posture. Continued irrigation with a 2 p.c. solution of carbolic is employed. The cervix is drawn down with volsella ; an india-rubber ring is passed over the volsella on to the cervix and placed so as to constrict the cervix just below the fornices (fig. 164). The cervix is pierced in the middle line from below with a straight needle on a fixed handle. A straight needle passes more easily through the dense tissue of the cervix ; if the cervix does not project sufficiently through the vulva to allow of the straight one being used, a curved one is required. When the point of the needle projects as far as the eye, this is threaded with a *long* wire suture and then drawn back (fig. 164, *MN*). A similar thread is carried through on either side of the middle line so that the cervical canal is pierced with three long sutures, one in the middle of it, and one at each side of it. The cervix is now split horizontally with the knife or scissors so as to divide it into an anterior and posterior lip; this horizontal section is carried as far as the sutures, so that they are exposed at the bottom of the incision.

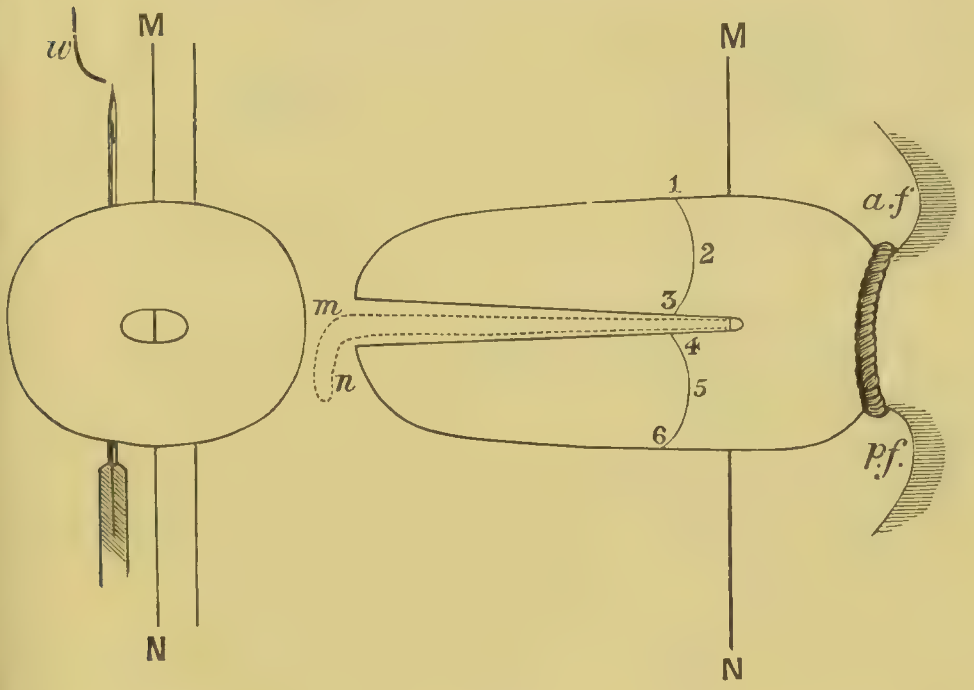


Fig. 164.

Diagram of amputation of cervix. To the right is seen the cervix with the ring constricting it, a suture, *MN* in position, the cervix split and the line of amputation marked 1 to 6; *a.f.* anterior and *p.f.* posterior fornix. To the left is seen the cervix in cross-section; two threads are passed and the needle carried through but not yet threaded with the wire *w*.

We now hook them up in turn and drag the loop of each down through the wound (fig. 164, *mn*). Each loop is then divided; the three sutures are thus converted into six—three through the base of each lip. A portion of the anterior lip is now excised along the line 1, 2, 3. The sutures are now used to bring together the margins of this amputation. The posterior lip is next treated in the same way. Additional sutures are put in on each side to close in the side walls of the cervix (fig. 165, *x* and *y*). When the cervix is not unusually thick, these lateral sutures are passed as in fig. 165; but when the cervical walls are thick, it makes a neater stump to bring these sutures also out through the cervical canal and unite vaginal to cervical mucous membrane all round (see fig. 167, *x* and *y*).

The peculiarity of this method of operating is, that the sutures are introduced before the knife is used. The advantages of this are the following:—it is easier to pass the needle through the dense tissue when the cervix is fixed with the volsella; the sutures serve as a means of traction when the portion grasped by the volsella has been cut away; we can ligature the flaps immediately after the lip has been amputated and thus check hæmorrhage—this refers specially to amputation in prolapsus uteri, where we cannot constrict the cervix with a ring.

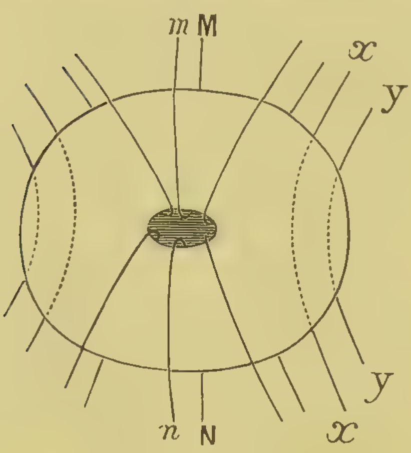


Fig. 165.

The suture *MN* has been divided and the halves brought down as *Mm*, *Nn*; the lateral ones also. *x*, *x* and *y*, *y* are additional side sutures.

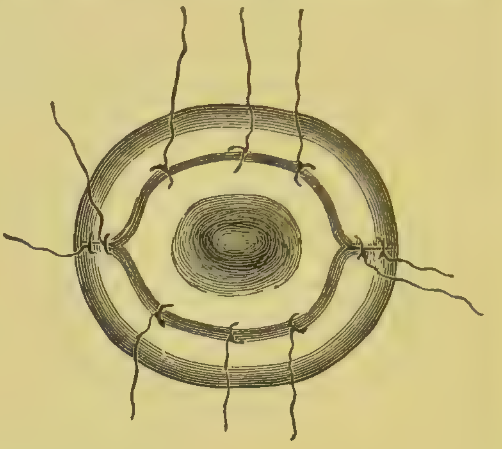


Fig. 166.

Appearance of stump of fig. 165 when sutures are twisted up.

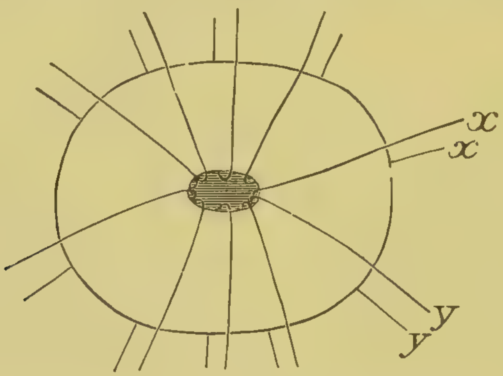


Fig. 167.

Mode of passing sutures when stump is very thick.

The appearance of the stump after the sutures have been twisted is seen at fig. 166. Wire sutures are most convenient in all operations on the cervix or vagina, because they are most easily removed. They should be twisted or tied; the ends are left long enough to protrude clear of the vulva; the free ends of the same suture are twisted together to keep them separate from the others; finally, all the ends are wrapped in a piece of lint to prevent their fretting the labia.

Removal of the Sutures. The sutures are removed in a week's time. The patient is put in the Sims' position and the Sims' speculum passed. Slight traction is made on a suture, and if the twisted knot is visible, we clip the wire with the wire scissors. Generally we find the knot is embedded in tissue; in which case the rake (fig. 168) is used to hook up the loop. In snipping the loop we place one blade of the scissors under it, and then press the tissue back from the wire so as to divide the loop as far away from the knot as possible.

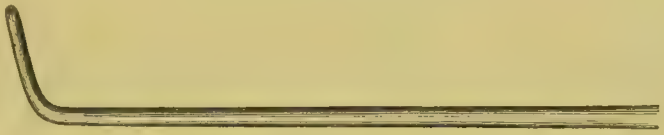


Fig. 168.

Point of rake; although finely made, it should be blunt ($\frac{1}{1}$).

Amputation with the *Ecraseur* or with the *Galvano-caustic wire* is not such a neat method of operating as with the knife. Further, there is liability to closure of the cervical canal through cicatrisation; this may be prevented by introducing a stem pessary after amputation. The galvano-caustic wire is recommended by Barnes, Thomas and others; its use has been followed with remarkably good results in the hands of Byrne of Brooklyn, whose valuable paper on this subject should be consulted.

The method of using the Ecraseur and galvano-cautery will be described under amputation of the cervix for carcinoma (see Chap. XL.).

With the galvano-caustic wire we must see that the wire does not *slip downwards*, and thus "scalp" instead of amputating the cervix. The fact that the galvano-cautery diminishes hæmorrhage is of no advantage in amputing the hypertrophied cervix. The use of the india-rubber ring makes this a bloodless operation; and the introduction of the sutures in the way described minimizes the danger of hæmorrhage where the ring is not employed.

B. HYPERTROPHY OF THE SUPRA-VAGINAL PORTION.

The existence of hypertrophy limited to the supra-vaginal portion of the cervix and not affecting the body of the uterus cannot be determined by *clinical* examination alone. The obvious reason is that we have no means of ascertaining in a case of hypertrophy where the precise upper limit of the cervix lies. The position of the os internum is not indicated by the sound, and the distance to which the utero-vesical pouch of peritoneum descends can only be ascertained on post-mortem examination. We cannot affirm, therefore, that the hypertrophy is limited to the supra-vaginal portion of the cervix and that it does not affect the body of the uterus as well.

In the present state of our knowledge it is impossible to say whether this hypertrophy is primary or secondary. We believe that in the great proportion of cases it is secondary to prolapsus uteri.

By French and by many German gynecologists, however, hypertrophy of the supra-vaginal portion of the cervix is considered a distinct primary lesion. Huguier first drew attention to the increase in the length of the uterine canal in cases described as prolapsus uteri; he affirmed that the fundus uteri always remained in its normal position, and that the os externum came to lie outside the vulva *because* the cervix had increased in length; this hypertrophied condition of the cervix was occasioned by a prolapse of the vaginal walls which made traction on the cervix, and thereby stimulated it to increased growth.

By these gynecologists, three forms of cervical hypertrophy are described according to the portion of the cervix which is hypertrophied. The division of the cervix into three portions—a vaginal, an intermediate, and a supra-vaginal portion—has been already described (see page 15). The vaginal portion is limited superiorly by the insertion of the anterior fornix; the intermediate by that of the posterior fornix; the supra-vaginal by the os internum. Hypertrophy of the vaginal portion is characterised by the *persistence of both* fornices in their normal position; it has been already described (see fig. 161). In hypertrophy of the intermediate portion the posterior fornix remains, while the *anterior is obliterated* (see fig. 169). In hypertrophy of the supra-vaginal portion *both anterior and posterior fornices are obliterated* (see fig. 170).

In the accompanying preparation (fig. 171), described by Barnes, the hypertrophy affects both uterus and cervix—if we take the utero-vesical pouch of peritoneum as indicating the position of the os internum. Winckel figures and describes a similar specimen (Die Pathologie der weiblichen Sexual-Organe, Tafel XIX*a*.).

As we have already said, we consider supra-vaginal hypertrophy to be merely one of the consequences of prolapsus uteri, under which its etiology, pathology, and diagnosis will be considered (*v.* Section VII.).

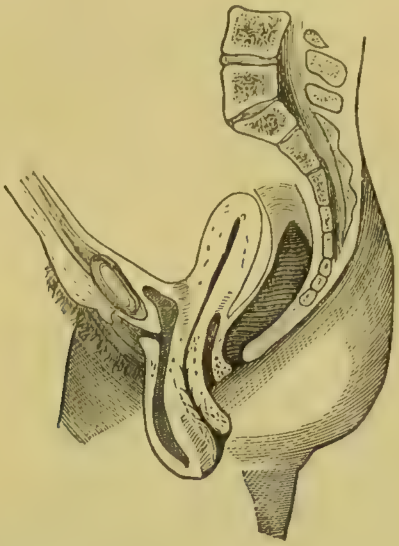


Fig. 169.

Hypertrophy of intermediate portion of cervix. The anterior fornix is obliterated (Schroeder).

Treatment. The amputation of the hypertrophied cervix, though a part of the treatment of prolapsus uteri, is most conveniently considered here, as it resembles the amputation in simple primary hypertrophy of the vaginal portion. In amputating for supra-vaginal hypertrophy,

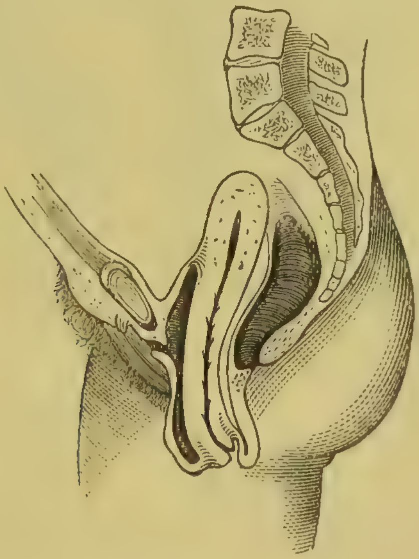


Fig. 170.

Hypertrophy of supra-vaginal portion of cervix. Both fornices are obliterated (Schroeder).

however, the *relations of the bladder and peritoneum* of the pouch of Douglas require to be considered. The bladder invariably descends for a varying distance in relation to the front of the hypertrophied cervix. The peritoneum of the pouch of Douglas, inasmuch as it lines the upper part of the posterior vaginal wall, will, when that wall is everted, dip down alongside of the hypertrophied cervix. If the posterior fornix is not obliterated, the peritoneum will not descend alongside of the protruding cervix.

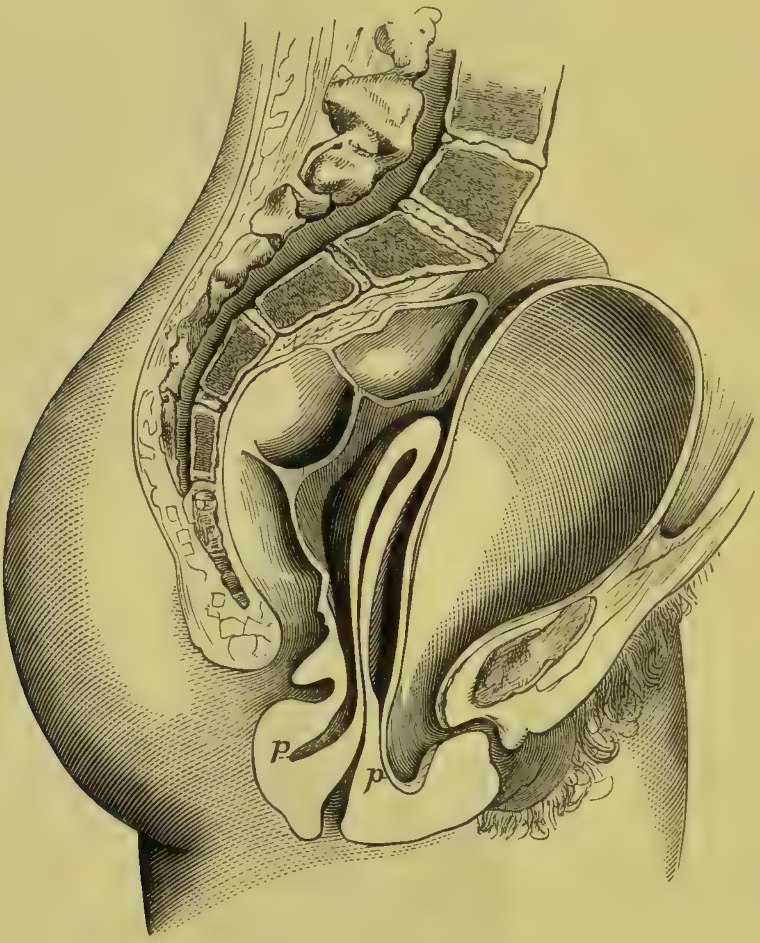


Fig. 171.

Prolapsus uteri with cervical hypertrophy (Barnes); *p*, *p*. peritoneum.

The relations of the bladder and peritoneum are represented diagrammatically in fig. 172. The line of reflection of the posterior vaginal wall on to the cervix indicates how much is vaginal portion, and by entering the needle below that line we keep clear of the pouch of peritoneum. The sound passed into the bladder will show us how far down that organ comes, and the needle is brought out an inch below that point.

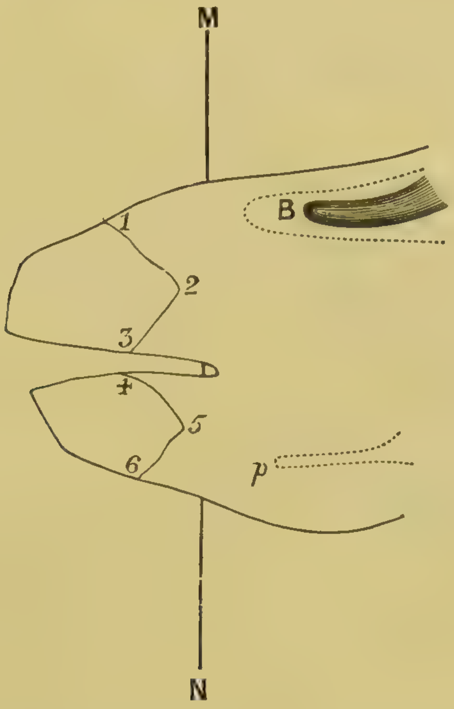


Fig. 172.

Amputation of Hypertrophied Cervix in Prolapsus uteri. *B* sound in bladder; *p* peritoneum of pouch of Douglas. The sutures are passed as *M N*, and the cervix split laterally, so as to form an anterior lip, which is amputated along lines 1, 2, 3, and a posterior lip amputated along 4, 5, 6.

The steps of the operation are the same as in the former case. A much smaller portion is excised here.

CHAPTER XXVII.

LACERATION OF THE CERVIX.

LITERATURE.

Baker—Boston Med. and Surg. Jour., April 1877. *Breisky*—Wiener med. Wochenschrift, 1876, Nos. 49-51: and Prager med. Wochenschrift, 1876, No. 18; 1877, No. 28. *Chase*—Trans. of Med. Soc. of State of New York, 1878. *Desvernine*—Thèse de Paris, 1879. *Dudley*—New York Med. Jour., Jan. 1878. *Emmet*—Surgery of the Cervix: Am. Jour. of Obst., Feb. 1869; ibid., Nov. 1874. American Practitioner: Indianapolis, Jan. 1877. Principles and Practice of Gynecology, p. 448: London, 1880. *Goodell*—Laceration of the Cervix: Philadelphia, 1878. *Hegar*—Operative Gynäkologie, S. 538: Stuttgart, 1881. *Howitz*—Gynäkologiske og. Obstetriciske Meddelelser, Bd. I., Heft 3. *Kaltenbach*—Ueber tiefe Scheiden—u. Cervicalrisse bei der Geburt: Zeitschrift f. Geb. u. Gyn., Bd. II., S. 274. *Klein*—Prager med. Wochenschrift, 1878, No. 24. *Lee*—The Proper Limitations of Emmet's Operation: New York Med. Jour., Sept. 1881. *Mundé*—Am. Jour. of Obst., Jan. 1879. *Nieberding*—Ueber Ectropium und Risse: Würzburg, 1879. *Olshausen*—Zur Pathologie der Cervicalrisse: Centralbl. f. Gyn., 1877, Nr. 13. *Pallen*—St Louis Med. and Surg. Jour., May 1868; Richmond and Louisville Med. Jour., 1874; British Med. Jour., May 1881. *Rokitansky*—Wiener med. Presse, 1876, Nr. 29. *Roser*—Das Ectropium am Muttermund: Arch. f. Heilk. II. Jahrg., 2 H., 1861. *Ruge u. Veit*—Zur Pathologie der Vaginal Portion. *Simpson, Sir J. Y.*—Edin. Jour. of Med. Science, 1851, p. 152. *Skene*—Proceedings of Med. Soc. of Kings, June 1878. *Spiegelberg*—Ueber Cervicalrisse, ihre Folgen u. ihre operative Beseitigung: Breslauer ärtz. Zeitschrift, 1879, No. 1. *Thomas*—Op. cit. p. 352.

The recognition of laceration of the cervix as a distinct and important lesion, with the operation introduced for its cure, is one of the many gynecological advances of the last twenty years. For this we are indebted to the genius of Dr Emmet of New York, who first drew attention to the clinical significance of the lesion and elaborated the operation for its removal. Sir James Simpson had previously drawn attention to its frequent occurrence, and its importance as a diagnostic of parturition. Roser of Marburg had described the pathology of the condition; but its importance as a factor in uterine disease was brought into notice by Emmet's first paper which was published in 1869, seven years after he had instituted the operation for its cure.

As the subject of laceration has only recently received attention and is at present a *quæstio vexata* in gynecology, we have given a full bibliography. After the writings of Emmet himself, the student might refer to Roser, Ruge, and Veit for the pathology of the lesion; to Mundé's article for diagnosis; and to the papers by Pallen and Lee for operative treatment.

PATHOLOGY.

The commonest *seat* of the laceration is to the front and left side of the cervix, probably because the long diameter of the child's head is most commonly in the right oblique diameter of the pelvis, and the thicker end of the wedge is to the front. The next in frequency is a double laceration—to the front and left, and to the back and right sides. Less frequently is the laceration at either end of the left oblique diameter. We have found lacerations to the front and right side in cases where the head presented right occipito-anterior. The *form* of the laceration is various—single (see fig. 173), double (see Plate VIII., fig. 2), or multiple (see fig. 174). The *extent* of the laceration varies, from a mere indentation of the ring of the os externum to a gaping fissure separating the lips of the cervix up to the vaginal fornices. Occasionally it extends into the roof of the vagina, and is marked by a cicatricial band drawing the cervix to one side. We have noted this in forceps cases, specially when the forceps had been applied before the os was dilated.

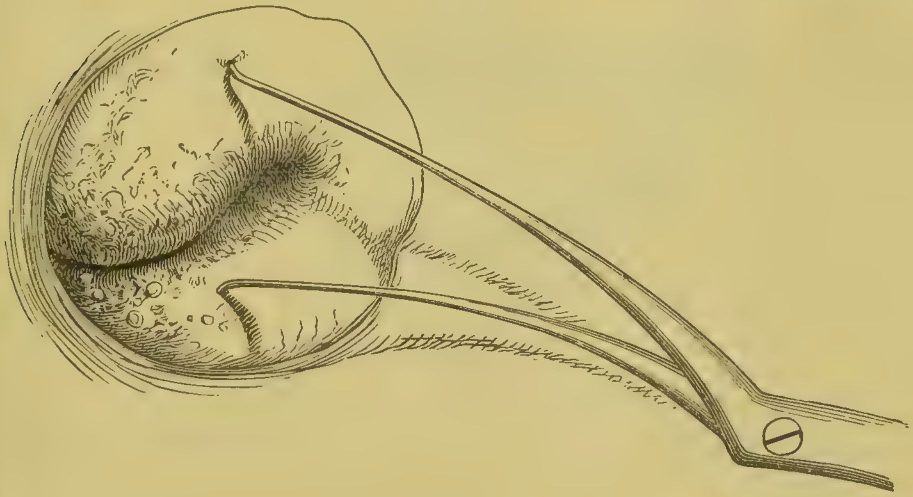


Fig. 173.

Single Laceration. The flaps are held apart with a double tenaculum (Emmet).

The *result* of the laceration is that the mucous membrane of the cervical canal is exposed; and, partly as an immediate result of the injury, partly from friction against the vaginal walls, the mucous membrane becomes inflamed (*v.* Cervical Catarrh). The submucous tissue is also thickened and the whole cervix thus hypertrophied. With these inflammatory changes there is *eversion* of the lips of the cervix. Emmet formerly explained its occurrence on purely mechanical principles—that the weight of the uterus pressed the cervix against the posterior vaginal wall, which flattened or "rolled out" the lips. In his most recent utterances, however, he has abandoned this theory.

This eversion is sometimes counteracted by the formation of cicatricial tissue in the cleft, which leads to approximation of its edges and even to its complete obliteration.

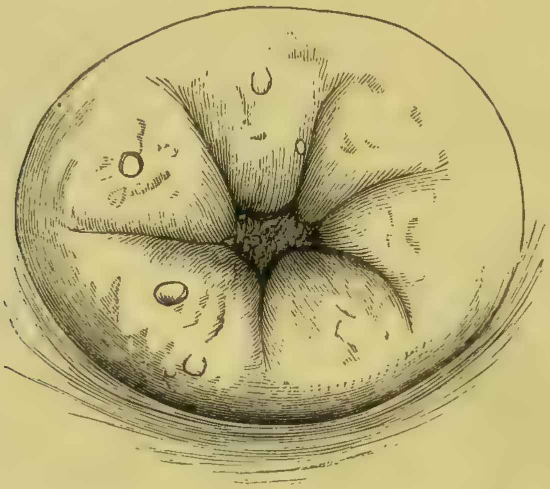


Fig. 174.

Multiple or Stellate Laceration (Emmet).

Other pathological conditions are often associated with lacerations. According to Emmet they are the result of it, though the causal connection is not obvious. Cellulitis is the most important of these; frequently we find, on the same side as the laceration, a localised cellulitis in the shape of a distinct deposit, or a tense condition of the utero-sacral or broad ligament, accompanied with pain on pressure through the fornix. Subinvolution of the uterus is also frequently present; there is a formation of cicatricial tissue, which compresses the bloodvessels and leads to passive congestion and hypertrophy.

Further, we find cylindrical epithelium covering the mucous membrane beyond the limits of the os externum. The cylindrical apparently proliferates more rapidly than the squamous epithelium, and, replacing it, produces the appearance of an Erosion (*v.* Cervical Catarrh, Chap. XXVIII.)

ETIOLOGY.

A laceration of the cervix will be found, according to Emmet's statistics, in 32·8 per cent. of parous women; according to Mundé, in 30 per cent. Though it is obvious that lacerations may be produced and heal again so that all trace of them escape notice, we cannot affirm that the cervix is lacerated with every first full-time labour. When present, a laceration of the cervix (if we exclude the possibility of the cervix having been divided artificially) *is the most reliable diagnostic of a former parturition.*

Of the condition of the cervical tissues which predispose to laceration we at present know nothing. It is evident that an indurated cervix would, *ceteris paribus,* be more liable to be torn than a flaccid one.

We should have expected that lacerations would be more readily produced in a rapid labour, in which the os had not time to dilate. Emmet and Pallen, however, have found that they are more commonly the result of tedious labours.

Barker and Mundé both draw attention to the fact that they are less common among the wealthy than among the poor. This is probably explained by the better care and longer rest in the puerperium which the former enjoy.

During pregnancy, according to Nieberding, slight fissuring of the cervix with ectropium is produced. He examined the cases admitted to the lying-in hospital at Wurzburg at three periods—during pregnancy, as shortly as possible after delivery, and on dismissal. Only in 26 per cent. of the primiparæ examined (thirty-eight cases) was the appearance of the cervix normal during pregnancy; in all the others more or less ectropium was present. In 50 per cent. there were in addition small fissures, which made the os stellate or irregular in form.

SYMPTOMS.

It is very important to know what symptoms are referable to a lacerated cervix. Those who revel in operative treatment ascribe every pathological condition in the uterus to lacerations, while others altogether deny that they have any pathological significance.

We advance the following considerations in regard to the symptoms.

1. Lacerations of the cervix in themselves produce no symptoms. Hæmorrhage may arise at the time of production, but is not a symptom of the persistence of the laceration.

2. Other pathological conditions arise secondarily as the result of the laceration, of which the most important is cervical catarrh; cicatricial tissue in the cleft may produce reflex nervous symptoms.

3. Pathological conditions are frequently present along with the laceration, as cellulitis and subinvolution. These have each their own train of symptoms. We are not as yet in a position to say how these are related to lacerations.

We sometimes find a well-marked laceration by chance, as it were, the patient having had no symptoms referable to a pelvic cause.

Frequently she complains of *leucorrhœa* and symptoms common to pelvic or uterine inflammation. *Menstruation* is often irregular, increased in 50 per cent. according to Emmet's statistics; this is in many cases due to subinvolution. *Neuralgia* is sometimes present, which may show itself locally in excessive tenderness to touch at the seat of laceration and has been compared to the sensitiveness present in toothache. In other cases it has taken the form of neuralgic pain in the pelvis generally, or sympathetic neuralgia elsewhere. It may seem a very gratuitous assumption to ascribe neuralgia to this cause; we know, however, that neuralgia is the result of nerve filaments being caught in the cicatrix of a stump; Emmet and others record cases in which persistent neuralgia disappeared on excision of the cicatricial plug in a lacerated cervix.

Cataleptic convulsions were present in an interesting case recorded by Sutton (Am. Gyn. Trans., 1880). The convulsions could be produced at will by pressing the finger into the angle of laceration, though they did not occur on any other manipulation of the cervix. They occurred spontaneously several times during the day. The excision of the cicatricial tissue by Emmet's operation effected a complete cure.

DIAGNOSIS.

This presents, in many cases, no difficulty.

The finger feels the indentation or fissuring of the vaginal portion. Sometimes the cervical canal is patulous, and admits the distal phalanx of the finger easily. Difficulty in diagnosis arises when there is much eversion of the mucous membrane of the cervical canal with thickening of the cervical tissue; the fissure is thus obliterated, because the circle of the os is not formed of the os externum but of a higher unfissured portion of the canal. This thickening and the velvety feeling of the everted mucous membrane lead us to suspect the condition.

The *speculum* clears up all uncertainty. We see a bright red irregular patch on one side of or surrounding the os; from its granular appearance, its vascularity, and the fact that it bleeds easily, it resembles an ulcerated surface. For this reason it is often described as "*ulceration*" of the cervix, but it is no more an ulceration than is the inflamed mucous membrane of the conjunctiva. By ulceration we understand a destruction and loss of tissue. The epithelium and subepithelial tissue may be destroyed as an immediate result of injury during labour; but the raw-looking surface, appearing secondary to and also independent of lacerations (see Catarrh in nulliparæ), is not an ulcerated surface and should therefore not be treated as such.

For the appearance presented by the various forms of laceration when seen in the speculum, the student should compare fig. 173 and fig. 174. The difference between the colour of the everted cervical mucous membrane and that of the vagina is represented in Plate VIII., figs. 1 and 2. A beautiful series of chromo-lithographs is appended to Mundé's article (Am. Jour. of Obst., Jan. 1879), which illustrates the various degrees of laceration. The most complete series is in Nieberding's pamphlet which gives representations of the cervix uteri before and after parturition, both in primiparæ and multiparæ; the colouring, however, is unnatural.

The microscopic changes which produce the appearance simulating ulceration will be described under Cervical Catarrh.

The *tenacula* are a valuable adjunct in examination with the speculum. If we place one in the anterior and one in the posterior lip, and roll these in on one another, the raw-looking surface will in many cases disappear. This easily demonstrated fact had not been recognised till Emmet drew attention to it, and based on it the operation which will be always associated with his name. By thus rolling the lips inwards, we restore the laceration and see the extent of it so as to judge of the possibility of approximating the lips with sutures.

We need not remind the student that he must not be satisfied with finding a laceration of the cervix, however striking it may appear in the speculum. The bimanual examination should be done with all the greater care, to ascertain that there is not also present cellulitis or subinvolution of the uterus.

TREATMENT.

Treatment, to be scientific, must be based on correct pathology. This, we think, is the strongest argument in favour of the reasonableness of Emmet's operation.

Like every new method in medicine and surgery, the operation has been performed in numbers of cases where it was not called for. After the student has been in practice he will find cases of chronic metritis (or subinvolution) and cellulitis the most difficult to treat; hence Emmet's operation was hailed in America by the weary and baffled gynecologist as the panacea for which he was waiting. This abuse of the operation in America is one reason why it is so slowly finding acceptance in this country. In Germany it has been taken up by Breisky, Spiegelberg, and others. Schrœder's operation for cervical catarrh is practically a bilateral Emmet's operation combined with excision of the cervical mucous membrane.

The stitching up of the laceration *immediately after parturition* was first performed by Pallen of New York. Having failed to check by the tampon post partum hæmorrhage from a lacerated cervix, he passed Sims' speculum and sewed up the laceration with silver-wire sutures; this checked the hæmorrhage. We have never had occasion to perform the "immediate" operation; injections of very hot water have always sufficed to check hæmorrhage. Considering the liability to septic inflammation in the puerperal condition, we would be very chary about operating unless the hæmorrhage were considerable and not diminished by hot injections.

The paring of the edges of an old laceration and uniting of them with sutures, we shall call "Emmet's operation"—a simpler and more suggestive name than "Trachelorraphy."

Indications for Emmet's operation.—In the treatment of lacerations as of many other uterine affections, skill may often be shown in knowing to leave the case alone rather than in operating. (See Lee's paper.)

We should not operate:—

1. When laceration, however well marked, has produced no symptoms.
2. Where chronic pelvic peritonitis or cellulitis is present.

As to the circumstances in which an operation is called for, Emmet says, "in every instance where the condition is evident, and where enlargement of the uterus still remains, or where the woman suffers from neuralgia, I consider an operation necessary, notwithstanding the parts may have completely healed." As he ascribes sterility to laceration, he holds this also as an indication for his operation in certain cases. Secondary catarrh may prevent conception, but lacerations are so common in the fertile that we should not consider them a cause of sterility.

We recommend the operation in cases of pronounced eversion of the mucous membrane with cervical catarrh, with or without subinvolution. Subinvolution often disappears after the operation, but we cannot say that this is due to the closure of the laceration; involution is stimulated by every operation on the cervix (*v.* chronic metritis).

Preliminaries to the Operation.—The patient should use warm water injections for some weeks previous to the operation, and apply a blister if there be any indication of cellulitis. Emmet lays great stress on this preparatory treatment, and says that we should not operate so long as there is any tenderness on pressure in the fornices. He further recommends, in cases where the cervix is thickened and the mucous follicles enlarged, scarification of the cervix and painting with iodine or tannin and glycerine.

The Operation. The following instruments are required:—

Vaginal douche,
Sims' speculum,
Volsella,
Tenacula,
Rubber ring,
Bistoury and scissors,
Dissecting forceps,
Short needles (fig. 112) straight and curved,
Needle holder,
Medium silver wire.

The patient is placed under chloroform in the lithotomy posture (in the semiprone posture by Emmet, but this does not give the operator so much room); the sacral segment is drawn back with the speculum by an assistant, and the cervix is laid hold of with the volsella and drawn down. Draw the edges of the laceration together with the tenacula to see how much tissue must be pared from the edges of the cleft to allow it to be sewed up, and then proceed to operate. Slip the rubber ring over the volsella on to the cervix and place it so as to constrict the base; this prevents bleeding and thus allows the operator

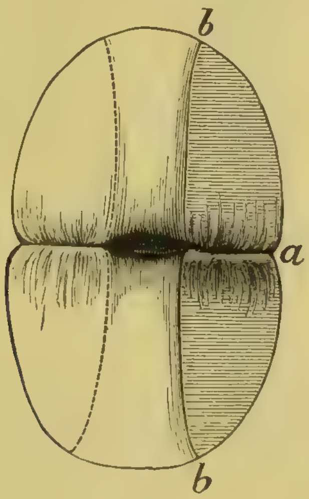


Fig. 175.
Operation for lacerated Cervix; *a b* extent of denuded surface.

to see that the edges are completely pared, which is essential to union of the raw surfaces. Wash out the vagina with carbolised water. When possible, continual irrigation is kept up during the operation; with this, the india-rubber ring is not required as the stream of water keeps the denuded surface always clean. Now pare the ? edges of the laceration with the scissors or knife (fig. 175); scissors are preferable, because they cut with greater ease and rapidity. With long-bladed scissors we can remove the tissue from one edge of the laceration with a steady clean cut right into the angle; Emmet lays great stress on the removal of the cicatricial tissue in the angle but uses the bistoury to do this. When the laceration is bilateral this must be done on both sides. Fig. 176 shows the extent of surface denuded by Emmet in a case of bilateral laceration. Great care must be taken to leave a broad strip (broader than represented in fig. 176) undenuded in the middle line to form the walls of

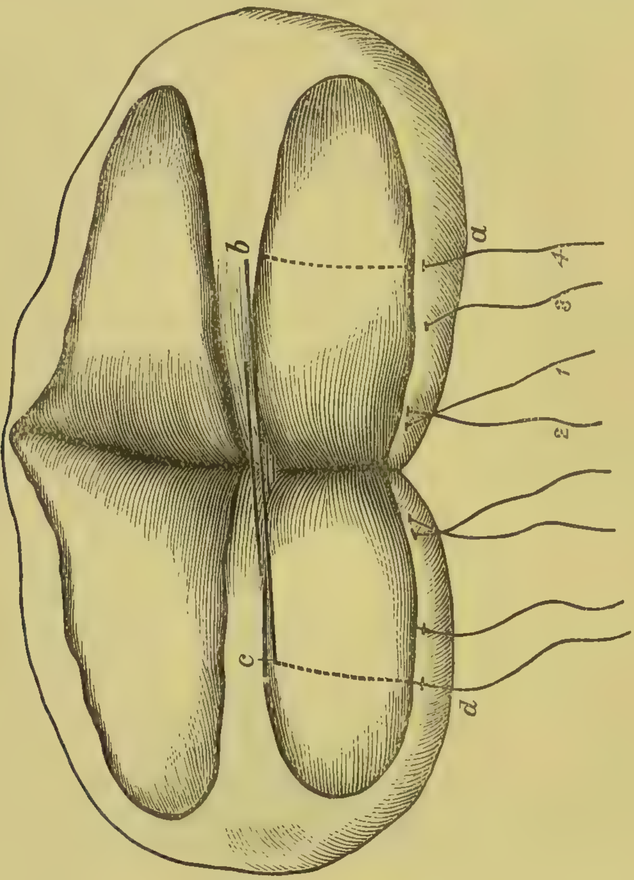


Fig. 176.

Extent of denuded surface and course of sutures according to Emmet (Emmet). The sutures are passed in order 1 2 3 4; the course of suture 4 alone is indicated by letters *a b c d*.

the cervical canal. Now introduce the sutures; these are about eight inches long so that both ends protrude from the vagina, and are well adapted to the eye of the needle so as not to obstruct its passage. Emmet recommends the round needle as it makes a smaller hole and is therefore followed by less hæmorrhage; when the tissues are dense, the lance-shaped point perforates more easily. Pass the

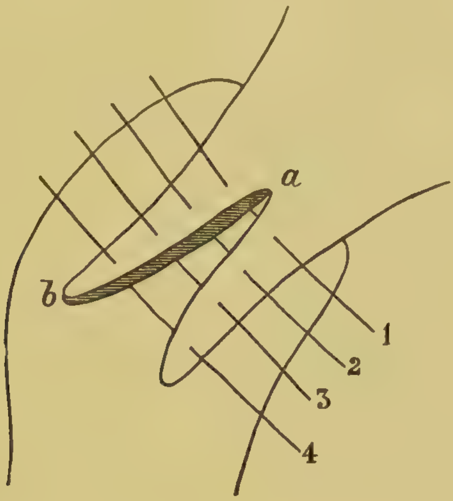


Fig. 177.
Mode of passing sutures; *a b* denuded surface as in fig. 175. The sutures are passed in order as numbered.

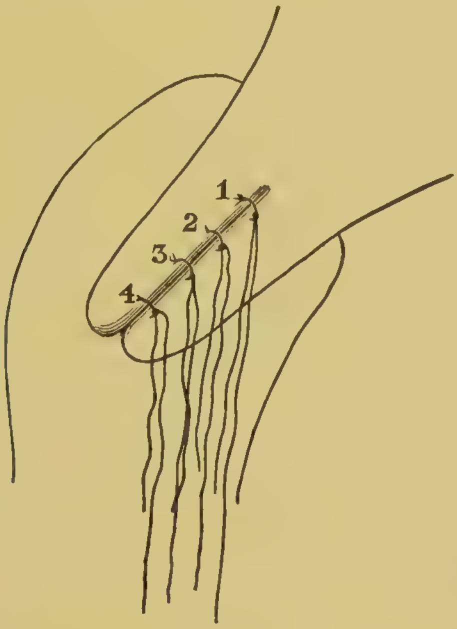


Fig. 178.
Appearance of Cervix when sutures twisted up. They are left long so as to extend to vaginal orifice and are removed in order as numbered.

sutures as in fig. 177, beginning at the upper part of the wound: each is drawn half through but is not twisted up till its fellows are in position, as it is sometimes necessary (when the tissues are thick) to pass the needle first through one lip and then through the other; they are then twisted up; the ends are brought out at the vaginal orifice, tied together, and wrapped round with a piece of wadding (fig. 178).

Emmet cuts the sutures short, but the long ends facilitate their removal. No special regimen is required afterwards, the diet need not be restricted.

Removal of sutures. The stitches are removed on the seventh or eighth day. To do this we require speculum, wire-scissors, rake and forceps. The rake is almost indispensable in removing sutures from the cervix or vagina; it is represented and described at fig. 168. The sutures are removed *from above downwards;* if we reverse the order, we may tear the lower portion apart in removing the upper sutures; if the surfaces have not entirely united, the lower sutures should be left in for a few days longer.

The cicatrix does not cause difficulty in subsequent parturitions.

CHAPTER XXVIII.

CHRONIC CERVICAL CATARRH.

LITERATURE.

Barnes—Op. cit. p. 530. *Bennett, G. H.*—Practical Treatise on Inflammation, Ulceration, and Induration of the Neck of the Uterus: London, 1845. *Clifton, Wing*—Brit. Med. Journ., Mar. 16, 1875. *Duncan, Matthews*—Clinical Lectures: London, 1879, p. 27. *Fischel*—Ein Beitrag zur Histologie der Erosionen der Portio Vaginalis Uteri: Archiv. f. Gyn., Bd. XV., Hft. 1. *Hatton*—Dublin Journ. of Med. Soc., 1st June 1875. *Hennig*—Der Katarrh der inneren weiblichen Geschlectstheile: Leipzig, 1862. *Heywood, Smith*—Obst. Journ. of Great Britain, 1876, p. 604. *Hildebrandt*—Volkmann's Sammlung klin. Vorträge: Leipzig, 1872, No. 32. *Klotz*—Gynäkologische Studien über die pathologischen Veränderung. der Portio Vaginalis Uteri: Wien, 1879. *Ruge and Veit*—Zeitschrift f. Geb. u. Gyn., Bd. II., S. 415. *Schroeder*—Op. cit., S. 122. *Thomas*—Op. cit., pp. 275 and 336.

Acute catarrh of the cervix is known to us only as part of a general catarrh affecting both body and cervix, and will be described under Acute Endometritis.

Chronic catarrh occurs localised in the cervical mucous membrane; it is a very common condition and one of the most troublesome which the practitioner has to treat.

PATHOLOGY.

The mucous membrane of the cervical canal is inflamed. When the os externum has been lacerated, the lips gape and the mucous membrane is thus everted; on bringing the margins of the laceration together, this eversion will disappear. Further, there are granular patches with irregular outline which extend beyond the limits of the os externum; these have a red appearance similar to the cervical mucous membrane, and therefore are sharply defined from the paler mucous membrane which covers the vaginal portion of the cervix.

This last condition was till late years generally held to be an "ulceration" and is still described, even in recent English works, under that name. The term should, however, be discarded as based on an erroneous pathology and suggesting most pernicious treatment. The cause of the error is easily explained: a raw-looking granular surface was seen in the speculum; the raw appearance was ascribed to the loss of the epithelium, and this supposition was supported by the microscopic examination of specimens taken from the dead body, in which the epithelium had been macerated and removed; the granular points were supposed to be the subjacent papillae which had become hypertrophied.

Both of these suppositions have been shown to be erroneous by the careful investigations of Ruge and Veit, who examined specimens of the so-called ulcerations cut fresh from the living subject; they demonstrated (1) that the apparently raw surface is covered with epithelium, (2) that the granular points are new formations and have no connection with the papillae of the mucous membrane.

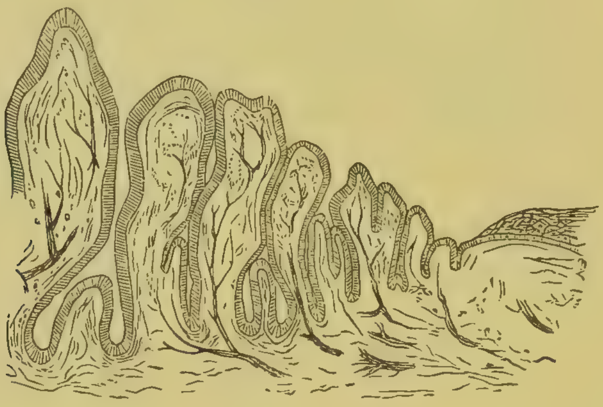


Fig. 179.
Papillary form of Erosion (Schrœder)

The microscopic appearance of the mucous membrane described by them is as follows. The surface is covered with a single layer of epithelium; the cells are smaller than those which line the normal cervical canal, and being narrow and long have a pallisade-like arrangement; the thin layer of cells allow the subjacent vascular tissue to shine through, hence the *redness* of colour. The surface is further thrown into numerous folds producing glandular recesses and processes; these processes cause the *granular* appearance of the surface. This condition is well seen in Plate VIII., and constitutes the *simple* erosion: fig. 1 shows such an erosion as seen in the speculum: fig. 3 shows a microscopic section of the same, stained with carmine; the left half of the section corresponds to the deep red portion of fig. 1, the right half to the paler portion outside of this. If the recesses be long and narrow, the surface is split up into distinct papillæ; this constitutes the *papillary* erosion (see fig. 179). If the ducts of the glandular recesses become obliterated, the secretion will distend the gland below and produce retention-cysts; these will increase in size, and may come to the surface and burst. Thus there is formed the *follicular* erosion (see fig. 180).

The raw-looking surface is therefore *a newly formed glandular secreting surface*, resembling in structure the cervical mucous membrane. This addition to the extent of secreting surface increases the leucorrhœal discharge which is the leading symptom.

These observations of Ruge and Veit have been confirmed in their essential points by Fischel and other observers; Fischel considers the secreting processes, while being new formations, to have the structure of papillæ and not to be mere foldings of the mucous membrane.

While there is, therefore, no disagreement as to the microscopical appearance of the so-called "ulcerations," the *origin* of this new epithelial structure is disputed. Ruge and Veit hold that this single layer of small cylindrical cells is produced by proliferation of the cells of the *deepest layer of the rete Malpighi*, while those of the superficial layer are shelled off; the appearance seen in fig. 180 favours this view. It will be observed also that they regard the simple follicular and papillary "ulcerations" as the results of one and the same process, viz., proliferation of epithelial cells. On the other hand, those red patches are generally continuous with the mucous membrane of the cervical canal and resemble it in their microscopic structure; it is therefore much more probable that they are occasioned by proliferation of the *epithelium which lines the cervical glands*, leading to an extension of the glandular surface beyond the os externum. Fischel holds that there is not only the proliferation of epithelial cells, but of connective tissue; and that, according to the preponderance of the one over the other, the follicular or papillary forms are produced.

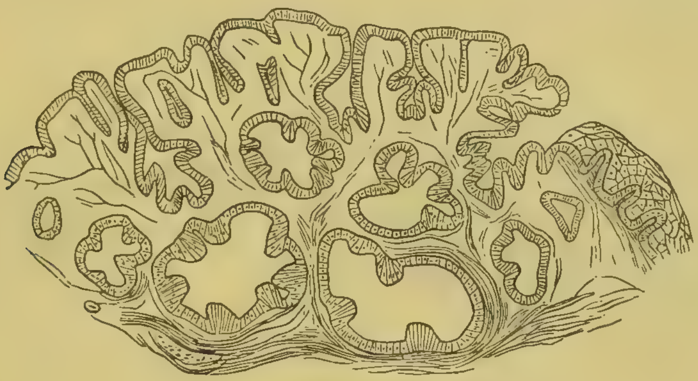


Fig. 180.
Follicular form of Erosion (Schrœder).

This description of the microscopic changes makes it evident that the process is not one of "ulceration;" and this term should, therefore, be abandoned. "Ectropium" or "Eversion of the mucous membrane" describes the condition in its relation to laceration, but does not describe the extension of the secreting surface beyond the os externum; the term is preferable to "ulceration," as, at least, it is not misleading. Thomas describes these conditions under the name of "Granular and Cystic Degeneration of the Cervix Uteri." This term is based on the naked eye *appearance* of the cervix, and conveys no idea as to the pathological change which takes place. Under granular degeneration, he describes the papillary form; under cystic degeneration, the follicular. As we are not in a position to introduce a term based on pathology, it is preferable to designate it according to its symptom as Cervical Catarrh. The red patches which lie outside the os externum we shall speak of as "*catarrhal patches.*"

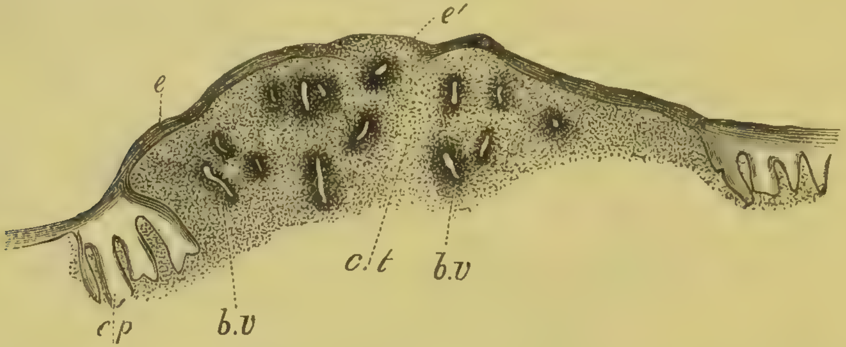


Fig. 181.

True ulceration of the cervix. At the sides of diagram is seen the normal epithelium, which is prolonged in processes, *e. p.* between the connective tissue papillæ; *e* is superficial layer of squamous epithelium reduced to a thin layer at *é*; *c t.* tissue of mucosa infiltrated with small cells; *b v*, blood vessels surrounded by small-celled infiltration. (Fischel.)

Sometimes a true ulcerated process—destruction of epithelium with inflammation of connective tissue—does occur; such a condition is represented in fig. 181.

Along with those changes in the mucous membrane, chronic inflammatory changes occur in the other tissues of the cervix. There is increased formation of connective tissue, which produces antero-posterior thickening and sometimes elongation. The secretion in the obstructed glands becomes inspissated, and hence the retention cysts are felt as firm pea-like bodies—Ovula Nabothii—in the substance of the cervix or projecting from it; or their contents may suppurate and form small abscesses. As there are no racemose glands on the vaginal portion beyond the limits of the os externum (see histology of normal Cervix, p. 19), these ovula nabothii must be produced from the glands of the mucous membrane of the cervical canal or from the newly-formed glandular tissue. Fritsch draws attention to the fact that the glands of the cervix are enormously hypertrophied during pregnancy, so that the cervix becomes almost a glandular organ ; the persistence of this condition after the puerperium, may explain the increased glandular formation which is described above as the chief pathological element in cervical catarrh.

Sometimes we find a single large cyst in the cervix, due to obstruction of the mucous glands. When it is in the substance of the wall, the soft bulging into the cervical canal and the accompanying menorrhagia may lead one to suspect commencing sarcomatous infiltration. Puncturing with a trocar removes a clear or straw-coloured fluid, rich in mucous corpuscles. We have seen a cyst of such a size as to cause serious obstruction to labour in a woman who had had a succession of uncomplicated labours.

The microscopic pathology of the cervix has only of recent years been carefully investigated, and there are many points on which definite information has not as yet been obtained. The following is a brief summary of the pathological changes described, which are best understood by comparison with the microscopic structure of the normal vaginal portion.

NORMAL CONDITION. The vaginal portion is covered on its vaginal surface with many layers of squamous epithelium, resting on papillæ of connective tissue ; there are no mucous follicles. The cervical canal is lined with a *single layer* of *cubical* epithelium (ciliated only on the free surface), folded so as to form shallow recesses which do not branch ; there are *racemose mucous glands*, which have branching ducts. The substance of the cervix is made up of *connective* tissue.

PATHOLOGICAL CHANGES. These, according to the extent and duration of the process, affect the three elements—epithelium, glands, connective tissue.

The *epithelium* of the cervical canal may be simply exposed (ectropium after laceration), or it may be inflamed. When inflamed, the folding of the mucous membrane is greatly increased so that the surface has a papillary or granular appearance. Further, this inflamed mucous surface may be found extending beyond its normal limit (the os externum) in the form of red patches (catarrhal patches) which are smooth or granular.

The *glands* hypertrophy, and new glands form as the result of the proliferation of epithelium described above. The openings of the glands are at first restricted to the area covered with a single layer of cubical epithelium, but their branching ends extend below the limiting surface of stratified squamous epithelium. Their ducts become obstructed, and retention cysts form not only on the red patches but also underneath the adjacent apparently normal vaginal mucous membrane. They may remain as little nodules in the mucous membrane, or may come to the surface and burst; in the latter case, the cubical epithelium and papillæ on the inner wall of the cyst are exposed and, being now on a free surface, proliferate. When the glands are the special seat of the pathological changes, the whole substance of the cervix is converted into a cystic mass.

The *connective tissue* always increases in amount, specially when the process is chronic. This increase constitutes the "areolar hyperplasia" of Thomas.

ETIOLOGY.

The most important cause is, undoubtedly, the injury of the cervix produced in *parturition;* hence cervical catarrh is common in parous women. How this injury produces the inflammatory condition is a disputed point. Emmet refers it immediately to the laceration, and holds that the exposure of the mucous membrane to friction against the vaginal walls leads to irritation and inflammation; but we frequently see cases of well-marked lacerations without consequent cervical catarrh. It is admitted by all that the existence of lacerations greatly favours the development of catarrh.

Other less important causes are the *spread of inflammation* from the vagina *upwards* (vaginitis, which may be simple or gonorrhœal), and from the endometrium *downwards.* The latter is favoured by the fact that the discharges from the endometrium necessarily flow over the cervix and irritate it.

Cervical catarrh is the most frequent complication of retroflexion of the uterus. The flexion favours gaping of the lacerated cervix and produces passive congestion of the cervical tissues.

SYMPTOMS.

These are—Leucorrhœa;
Pain in back and loins, increased on exercise;
Irregular menstruation;
Sterility.

Leucorrhœa is the prominent symptom. Under normal conditions the secretion from the mucous membrane of the uterus and cervix is not sufficient to attract attention; when it is excessive, it is termed leucorrhœa (λευκός white, ῥέω to flow) or in popular language "whites." A transient leucorrhœa from the cervix and uterus occurs before and after the menstrual flow; this is a hyper-secretion due to temporary congestion.

The secretion from the glands of the cervical canal is clear and viscid, resembling unboiled white of egg. It becomes of an opaque white when mucous corpuscles are abundant, yellowish when pus corpuscles are present. Frequently, it is tinged with blood from the bloodvessels of the newly-formed vascular tissue.

Pain in the back and loins is present, as in all uterine disease. It is aggravated on active exercise, such as walking and riding, or whatever causes friction of the cervix against the vaginal walls. Pain on coitus is sometimes present.

Menstruation is irregular, and often increased in quantity; this is probably due to extension of inflammation upwards to the endometrium. We must take care not to mistake leucorrhœa tinged with blood for the regular menstrual flow.

Sterility is often present. In nulliparæ with a small os externum, the plug of mucus in the cervical canal is often an effectual bar to conception. In multiparæ, we have seen conception take place even though there was a deep laceration and well-marked catarrh; the presence of catarrh, however, though not an obstacle to conception, greatly diminishes its probability.

PHYSICAL SIGNS.

On *vaginal examination*, the condition of the cervix is found to vary according as the patient is nulliparous or multiparous and the disease of long or short duration. In a nullipara, the cervix feels puffy and large, the margins of the os soft and velvety (when there is eversion with extension of catarrhal area beyond the os externum); or the os and cervix are apparently normal but movement causes pain (when the catarrhal area does not extend beyond the os externum). In a multipara, the existence of a laceration must first be determined and the extent of it noted; the margins of the os are soft and velvety, and pea-like nodules (nabothian follicles) are felt on and sometimes round them; polypoidal projections may be present and, more rarely, the cervix is converted into a mass of cysts; the os is usually gaping so that the finger can be passed into the cervical canal, where the mucous membrane has an irregular surface and is often thrown into longitudinal ridges.

The *speculum* is now employed; its use must always be preceded by a careful examination with the finger to ascertain, when laceration is present, the undisturbed relations of the lips of the cervix. Neither finger nor speculum alone is sufficient, we must employ both, and learn to associate what is felt by the finger (*e.g.*, lacerations, velvety mucous membrane, pea-like follicles) with what is seen with the speculum. The superiority of the Sims speculum for examination is very marked, as it exposes the lips of the cervix without disturbing the relations.

In a nullipara, we see the os apparently normal but with a tenacious plug of mucus projecting through it; or there may be red catarrhal patches such as are represented in Plate VIII. fig. 1, which shows very well the contrast between the appearance of these patches and the surrounding mucous membrane; no chromo-lithograph, however, perfectly displays the natural colours.

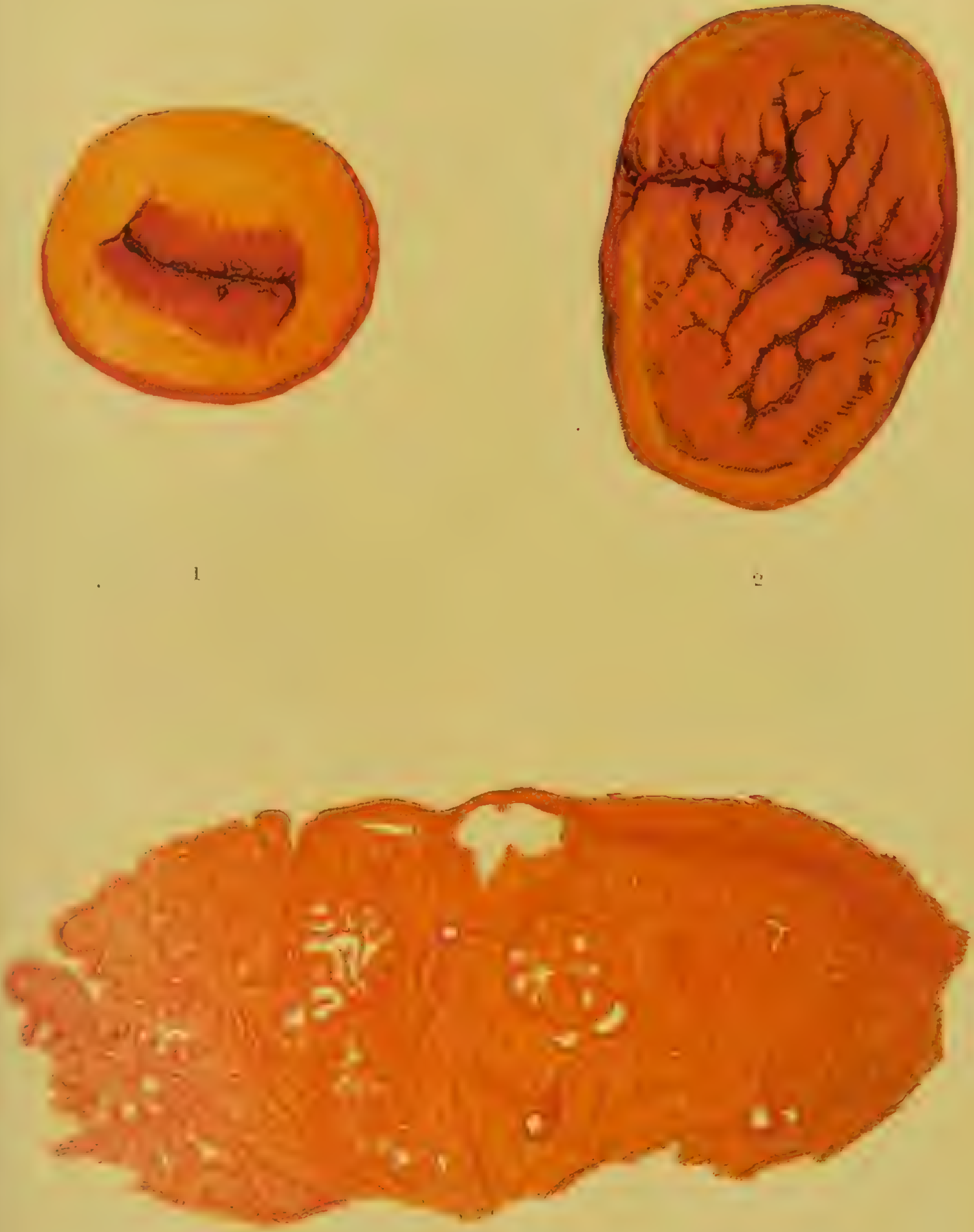
In a multipara, a laceration is sometimes evident. Oftener it escapes recognition; the os appears to be wide and unfissured, while on both lips there is a red velvety surface (Plate VIII., fig. 2); if, now, tenacula be fixed in the gaping lips and these rolled in on one another, the red surfaces will disappear and a bilateral laceration become evident. Sometimes, white cicatricial tissue indicates the situation of the laceration. Though the lips are thus approximated, a red surface is often visible because the catarrhal area has spread beyond the os externum. The obstructed Nabothian follicles appear as bluish-red projections from the mucous membrane; occasionally, they appear as small polypi.

DIAGNOSIS AND DIFFERENTIAL DIAGNOSIS.

The diagnosis between cervical and vaginal catarrh is made clear by using the speculum, for we see in the former case the leucorrhœa coming from the cervix and having the characters above described. Should the discharge not be profuse enough to be seen with the speculum, we may employ the method recommended by Schultze for diagnosing between uterine and vaginal catarrh. The vagina is washed out in the evening, and a tampon soaked in a solution of tannin is placed against the os externum; in the morning the tampon is removed through the speculum, and we note the quantity and character of the discharge which has accumulated above it.

The diagnosis between cervical catarrh and endometritis is difficult, and in many cases cannot be made; when cervical catarrh is present, we cannot be positive that there is not some endometritis as well. Increase in the length of the uterine cavity (especially with tenderness or irregularities of the mucous membrane), ascertained by the sound, indicates endometritis. When the cervix is much thickened and indurated, we may suspect the commencement of malignant disease; this will be considered under Carcinoma of the Cervix.

PLATE VIII



1

2

3

EROSION AND LACERATION OF CERVIX (Ruge and Veit).

PROGNOSIS.

In this we must consider the constitutional health of the patient, the duration of the symptoms, and the extent to which the tissues are affected. According to Thomas, the prognosis is less favourable when there is considerable secretion of mucus with little apparent "granular degeneration." The practitioner will often find that cases of cervical catarrh have already passed through several hands, and he should therefore be on his guard in offering hopes of speedy cure.

TREATMENT.

In the first place, special attention must be given to the patient's *general health;* if we trust to local treatment alone, we shall often be disappointed. We should recommend change of air and light nourishing food. A certain amount of exercise is valuable; but too much of it, specially of riding, is injurious. Tonics (such as arsenic, quinine, and iron) are useful. Disturbances of the digestive system, which are frequent in chronic cases, must be treated as each case indicates. Complete rest from sexual activity is advisable; this can often be secured by recommending that the patient go away from home for a time.

Cervical catarrh is in some cases only a local manifestation of a constitutional state such as tuberculosis or anœmia.

The *local treatment* varies according as the patient is nulliparous or multiparous. In both cases we must be prepared to carry out a system of treatment which lasts for weeks.

1. *In nulliparæ* we begin with a course of vaginal injections of warm water. These are used freely, from ten minutes to a quarter of an hour, every night. To the simple water, sulphate of zinc (ʒ1 to the pint) sulphate of alumina or sulphate of copper (ʒ2 to the pint) may be added.

If the os be narrow, as it usually is, it is good to notch it bilaterally with the scissors. This acts beneficially in three ways—by allowing the mucus to escape freely, by opening up the canal so as to allow of further applications, by favouring the occurrence of pregnancy.

When catarrhal patches are present round the os, or when we find that the secretion continues copious in spite of the frequent injections, we must make a local application to the mucous membrane. Of applications the best are iodine (the tincture or the strong liniment) and carbolic acid, the former in milder and the latter in more severe cases. The liquor hydrargyri pernitratis is recommended by Heywood Smith, and chromic acid is much praised by de Sinéty. In making these applications we proceed as follows:—the mucus, which would prevent the action of the medicament on the mucous membrane, is first thoroughly removed by the forceps dressed with cotton wool as represented at fig. 182. A second pair of forceps, covered merely with a film of cotton wadding, is now dipped in the medicament and applied to the surface. Should the canal be narrow, a sound dressed as for endometric applications (see fig. 190) is preferable. Care is taken that there be no free drop of the solution on the cotton wool, which might fall on the vaginal mucous membrane; after the application is made, a jet of water is thrown on the cervix to wash off any superfluous acid and a pledget of cotton wadding with glycerine is placed below the cervix.

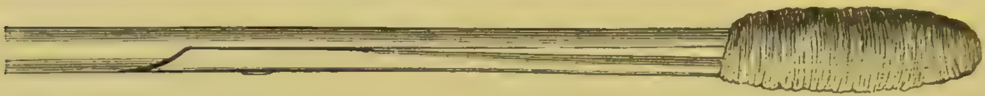


Fig. 182.
Forceps dressed with cotton wadding.

Rarely in nulliparæ is the pathological process so extensive as to require operative means for removing cervical tissue.

2. *In multiparæ.* Here the cervical catarrh is usually associated with other conditions—retroflexion, subinvolution, and, especially, marked laceration of the cervix. The first treatment indicated is to diminish the passive congestion of the cervix by hot water injections and the use of the glycerine plug. The latter is prepared as already described (p. 182), and should be renewed daily. The patient can introduce it herself with Barnes' speculum (fig. 183). A simpler means is to draw the string through a piece of glass tubing, and to keep it taut with the finger on the end of the tube till the plug is carried into the roof of the vagina; then the finger is removed and the tube is slipped out over the string. If the uterus be retroflexed, it should be replaced and kept in position by a pessary. Even where it is not displaced, a pessary is often useful in lifting the uterus upwards in the pelvis and diminishing

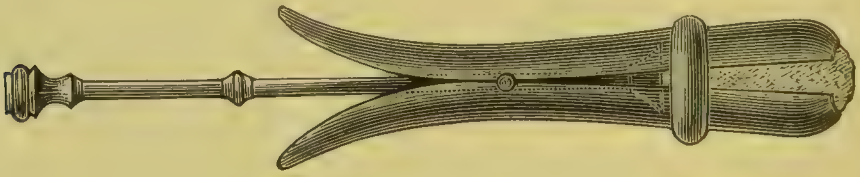


Fig. 183.
Barnes' speculum for introduction of medicated cotton wool into the vagina (Barnes).

passive congestion. In cases where there is a distinct laceration of the cervix, and specially where the catarrhal patches can be made to disappear by rolling the lips inwards on each other, Emmet's operation is indicated.

Local depletion by scarification or leeches was formerly much employed, but is going out; its effects are only transitory. Scarification is done best through the Fergusson speculum, and with a lancet shaped bistoury; a number of small punctures are made, from a quarter to half-an-inch in depth. Leeches are applied as follows :—Fergusson's speculum is passed; a pledget of lint, with string attached, is placed in the cervical canal to prevent their crawling upwards into the uterine cavity; a little blood is drawn by superficial scratches and three or four leeches thrown into the speculum, and pushed up towards the cervix with a pledget of cotton wadding. We must watch the speculum lest the leeches slip out; after the speculum and leeches are removed, the vagina is douched with a tepid injection of carbolised water.

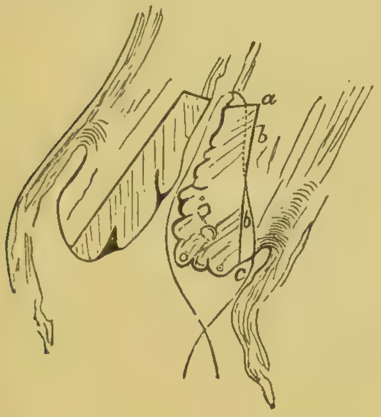


Fig. 184.

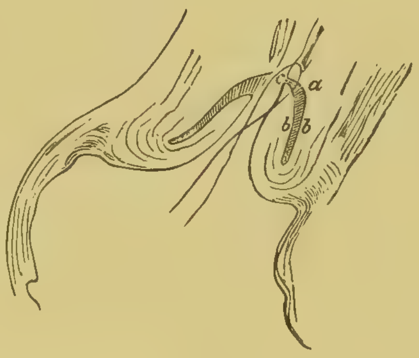


Fig. 185.

Schroeder's excision of the cervical mucous membrane in cervical catarrh. Fig. 184 line of incision in mucous membrane. Fig. 185 mucous membrane excised and flap *bc.* turned in on *ab.* (Schroeder).

Scarification is, however, useful for another object. When there are hard knobby retention cysts producing irritation by the pressure of their contents, the puncturing of these diminishes the chronic inflammation. When these cysts project as small polypi, they are easily snipped off.

In very chronic cases, the only remedy is the destruction of the diseased glandular tissue—just as in tonsilitis we excise the tonsils. This has been done by the application of strong nitric acid or the cautery; but the use of the curette or knife is a much more effective and safe method than any process of cauterisation. Thomas commends the steel curette for the removal of the diseased glands; it is applied 'so forcibly as to remove the arbor vitæ and mucous glands from the os internum to the os externum. Sometimes a second operation in two or three weeks after the first has been necessary, and sometimes even a third.'

Schrœder uses the knife, and operates as follows. The cervix is laid hold of with two volsella, one on each lip, and drawn downwards. It is divided laterally as far as the fornix with the scissors, so as to form an anterior and a posterior lip which are separate as far as the vaginal roof (fig. 184). A transverse incision (seen in section, at *a*, in fig. 185) is made across the base of the anterior lip, dividing the whole thickness of the cervical mucous membrane. He next pierces the point of the lip at *c*, pushing the knife in the direction *bb* till it reaches the cross incision *a*; he carries the blade outwards first to one side and then to the other, so that all outside of the line *a b c* is cut away. The flap of cervix is now turned in, and stitched as in fig. 185. The advantage claimed for this method of operating is that the degenerated cervical mucous membrane is replaced by vaginal mucous membrane which shows no tendency to degenerate. Schroeder has operated thus more than three hundred and fifty times (two deaths), and with very good results as to the cure of the catarrh.

CHAPTER XXIX.

ENDOMETRITIS.

LITERATURE.

Atthill—On Endometritis: Dublin Jour. of Med. Sc., Jan., 1873. *Barnes*—Op. cit., p 530. *Braun Carl*—Therapie der Metritis und Endometritis, etc.: Wiener med. Wochenschrift, 1873, Nos. 39-43. *De Sinéty*—Gynecologie, p. 327: Paris, 1879. *Guérin*—De la Métrite aigue: Annales de Gynecolog., Juillet, 1874; and Arch. de Tocologie, July 1877. *Hennig*—Der Katarrh der inneren weiblichen Geschlechtstheile: Leipsig, 1862. *Klob*—Op. cit. S. 211. *Olshausen*—Ueber chronische hyperplasirende Endometritis des Corpus Uteri: Archiv. f. Gynäkologie, Band. VIII., Heft 1. *Playfair*—Intra-uterine Medication: Brit. Med. Jour., December 1869; ibid, March, 1880; Lancet, January and February, 1873. *Récamier*—Union Méd. de Paris, 1850, 1-8 Juin. *Routh*—On "Fundal Endometritis:" Obst. Trans., Vol. XII. Cases of Menorrhagia treated by injections, etc.: Obst. Trans., Vol. II. *Schrœder*—Op. cit., S. 108. *Simpson, Sir J. Y.*—Op. cit., p. 736. *Smith Tyler*—Pathology and Treatment of Leucorrhoea: London, 1855. *Thomas*—Op. cit., p. 268.

Inflammatory action may affect the peritoneal covering, the muscular substance, or the mucous membrane of the uterus, producing *perimetritis*, *metritis*, or *endometritis*. Usually we find more than one of these conditions present at once, as the inflammatory action is rarely limited to one of these coats. Perimetritis is only a part of pelvic peritonitis, under which head it has already been considered.

We now consider inflammation limited to the mucous membrane of the uterus—endometritis, which may be acute or chronic.

Definition.—Inflammation of the mucous membrane of the uterus.

Synonyms.—Uterine catarrh, internal metritis.

PATHOLOGY.

In *acute endometritis* both body and cervix are involved, and usually the underlying muscular coat also. The mucous membrane is swollen and soft, and covered with red stained mucus or creamy pus. Extravasations of blood are present as red streaks or patches. These changes are not so marked in the cervical mucous membrane as in that of the body ; the vaginal portion has the same appearance as during pregnancy, being soft and swollen and showing round the os red catarrhal patches.

The ciliated epithelium is destroyed, and sometimes casts of the epithelium of the glands are found in the discharge (Schrœder). The secretion is at first serous, then purulent.

In *chronic endometritis*, the mucous membrane is hypertrophied and marked with patches of old extravasation.

The microscopic appearances vary with the structures which are principally affected. Our knowledge upon this subject is principally derived from the examination of the portion of mucous membrane removed by the curette. We can distinguish three pathological types according to the tissue chiefly involved. In the first, the glands are hypertrophied ; in the second, the vessels are dilated and enlarged ; in the third, an undifferentiated embryonic tissue is produced. We must remember, however, that in no case is one structure alone affected ; there is no hard and fast line between the different processes. For the following description we are indebted to the researches of Olshausen, Carl Ruge, and de Sinéty.

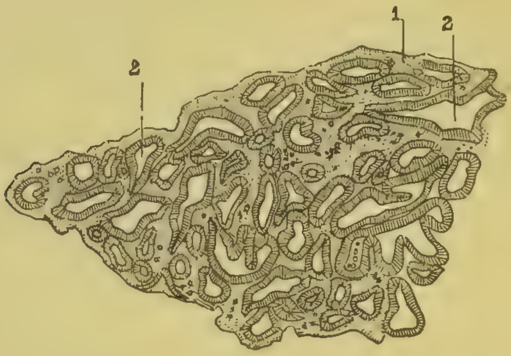


Fig. 186.

Cross section of a granulation in a case of Endometritis $\frac{40}{1}$. 1. Stroma; 2. dilated glands (de Sinéty).

According to Schroeder's clinical observations, the microscopic investigation of which has been made by Ruge, the most frequent condition is a hypertrophy of the glands. In some cases they are so much hypertrophied that the granulations appear as masses of glandular tissue, as is well shown by the accompanying figure from De Sinéty (186). In such a condition, the chief symptom is leucorrhœa.

Olshausen has described very carefully the changes of the mucous membrane in cases of the second type, in which the only symptom is hæmorrhage. The mucous membrane is hypertrophied to three or four times its normal thickness. It is elevated through its whole extent in a soft cushion-like swelling, or in more localised spongy masses; the hypertrophy does not extend beyond the os internum to the cervix and thus resembles in its situation a decidual membrane. The portions removed by the curette are unusually thick; one side presents a smooth rose-coloured surface which resembles the appearance of the mucous membrane of the intestine, and the other has a deep-red raw-surface. "The microscopic examination of these scrapings," Olshausen says, "shows that there is great hypertrophy of the mucous membrane with increase of all its elements—moderate dilatation of the lumina of the glands, enlargement of the blood-vessels, and marked cellular infiltration of the connective tissue" (fig. 187). The characteristics of this type are, that the glands do not become enlarged so as to produce cystic dilatations, and that the blood-vessels are greatly distended; the latter fact explains the

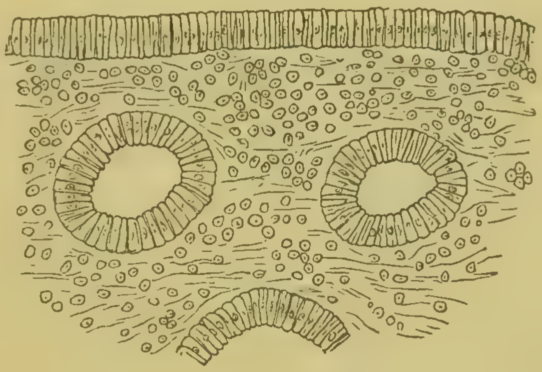


Fig. 187.

Vascular type of Endometritis—Endometritis fungosa (Olshausen).

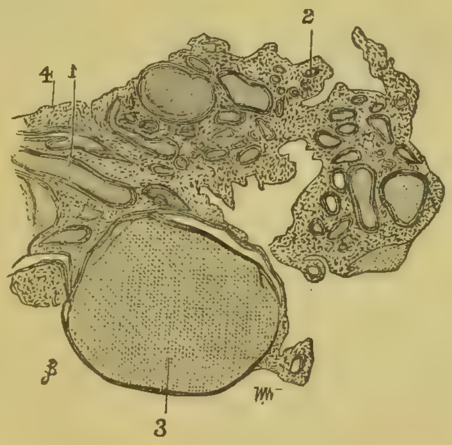


Fig. 188.

Cross section of granulation composed of dilated vessels in a case of endometritis $\frac{40}{1}$. 1. Vessels cut longitudinally; 2. vessels cut transversely; 3. dilated vessel filled with blood corpuscles; 4. embryonic tissue (de Sinéty).

hæmorrhage which is the chief symptom. The absence of the increased leucorrhœal discharge so characteristic of the polypoidal form, is probably due to the fact that the glands are not markedly affected. De Sinéty gives a figure which shows the dilatation of the blood-vessels in this vascular type of endometritis (fig. 188).

The third type is described only by de Sinéty. "In other cases," he says, "the vegetations are specially constituted of embryonic tissue with few bloodvessels. There are only traces of the glands and some remains of more or less degenerated epithelium. We have to do with a truly inflammatory tissue comparable to that which forms upon an exposed wound. At certain points there are islands of degenerated elements which are not coloured by reagents and are analogous to those observed in foci producing pus. This degeneration of embryonic elements explains to us the abundance of the muco-purulent discharge observed during life" (fig. 189).

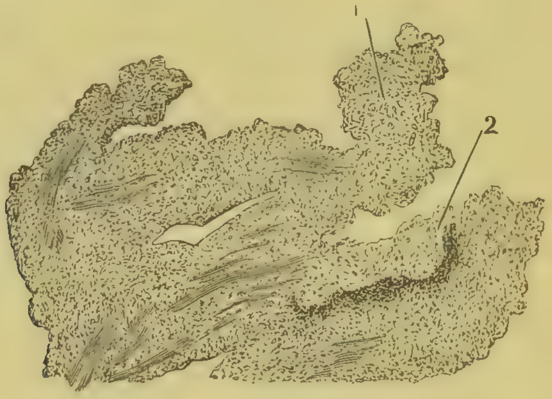


Fig. 189.

Cross section of granulation composed of embryonic elements, from a case of endometritis ♀; 1. embryonic tissue; 2. part undergoing fatty degeneration (de Sinéty).

When chronic endometritis has persisted for a long time, the mucous membrane becomes atrophied: the ciliated and afterwards the cylindrical epithelium is lost, and small polymorphous cells resembling squamous epithelium take their place; finally, the mucous membrane disappears altogether and the uterine cavity comes to be lined with a layer of connective tissue. The glands fall out so that the mucous membrane becomes mesh-like, or they are constricted to form retention cysts. (Schroeder).

Senile atresia of the cervical canal is the result of a localised chronic endometritis. This is one of the physiological changes which occur after the menopause. In some cases, however, it becomes pathological; accumulation of mucus, more rarely of blood, takes place above the obstruction and produces the changes of endometritis.

Routh describes a form of endometritis in which the inflammatory process is limited to the fundus uteri—the area between the orifices of the Fallopian tubes; his description is, however, based on clinical observation rather than pathological data.

ETIOLOGY.

Acute endometritis is a rare condition, and never occurs before puberty. It comes on most frequently in connection with menstruation, when the physiological congestion readily passes into inflammation. It is occasioned by exposure to cold or sexual excess at the periods, and by the extension of gonorrhœal inflammation from the mucous membrane of the vagina. It also occurs in the exanthemata, typhus, scarlet fever, and measles; it has further been observed in cholera (Slavjansky), and in certain cases of phosphorus poisoning. In puerperal inflammation, endometritis is of course present.

Chronic endometritis is occasionally the result of acute; most frequently, however, it arises independently. Sometimes it is merely the indication of the constitutional state; in scrofulous and chlorotic cases, the normal leucorrhœa (which precedes and follows menstruation) is increased in quantity and prolonged during the intermenstrual period. This is due to hypersecretion rather than to inflammation. Increased leucorrhœa, with diminished menstrual flow, is quite characteristic in phthisis.

Chronic endometritis arises independently from the following causes:—

Parturition, specially when the uterus has not been completely emptied;
Exposure to cold during menstruation;
Obstruction to the menstrual flow;
Uterine displacements, specially retroflexion and prolapsus;
Polypi or other tumours in the uterine cavity;
Direct injury through incautious use of sound or tent;
Excessive sexual activity;
Extension of gonorrhœal or simple inflammation from vagina and cervix.

Of these the most important are *parturition* and *displacements.*

As regards parturition, endometritis is frequent after abortion; usually this is due to the patient's rising too soon, or to the incomplete emptying of the uterus. After full-time labour, the seat of the placenta seems to be in many cases the starting point of the inflammatory process.

In nulliparæ with a narrow os externum causing obstruction to the menstrual flow, we frequently find the uterine cavity increased in length and endometritis present.

Uterine displacements do not necessarily produce endometritis. We sometimes find a retroversion or retroflexion which has produced no symptoms. As a rule chronic inflammation of the endometrium, as well as of the muscular coat, results from passive congestion.

SYMPTOMS.

A. *Of Acute Endometritis.*

These are fever more or less severe according to the inflammation, pain in the back and lower part of the abdomen with the sensation of weight in the pelvis, and in severe cases vesical and rectal tenesmus. The characteristic symptom is the discharge, which is at first clear and watery but after a few days becomes creamy and purulent. The menstrual flow is sometimes suppressed, rarely is it increased.

B. *Of Chronic Endometritis.*

The leading symptoms are the following :—

Leucorrhœa ;
Menorrhagia ;
Dysmenorrhœa ;
Weakness in the back ;
Pain in pelvis and loins ;
Digestive derangements ;
Nervous derangements ;
Sterility ;
Abortion.

Leucorrhœa is the characteristic symptom. The secretion from the body of the uterus is of a watery character, less dense and gelatinous than that from the cervix ; usually, however, there is cervical catarrh as well. The uterine secretion has an alkaline reaction, while vaginal leucorrhœa is acid. Sometimes it is tinged with blood, producing an appearance which Bennet aptly compares to the rust-coloured sputum in pneumonia. This blood-stained leucorrhœa must not be confounded with the menstrual flow. In some cases the discharge is purulent, accumulates in the uterine cavity, and is only discharged at intervals.

Menorrhagia is frequently present. In one class of cases (see Pathology) it is the leading symptom, and is grave from the anæmia which it produces. It shows itself first in increased duration of the menstrual flow, which becomes gradually prolonged over the intermenstrual period till the loss of blood becomes continuous. *Dysmen-*

orrhœa is frequently present, but is more probably due to complications (*e.g.*, flexions or chronic metritis) than to the condition of the mucous membrane. Membranous dysmenorrhœa (accompanied with exfoliation of the mucous membrane at the menstrual period) might be considered here, as its pathology is most nearly allied to endometritis; from its peculiar symptoms, however, it is better to consider it in the chapter on Dysmenorrhœa (Section VIII.).

"*Weakness in the back*" is the common complaint made by the patient. It may amount to actual pain, but more generally it shows itself as feebleness or weariness which incapacitates the patient for her daily work.

Derangements of the digestive and nervous systems invariably follow when the disease has become chronic. There is impaired digestion with loss of appetite and, as the result, general debility. Whether these are due to the drain of the system produced by the leucorrhœa or to the close connection between the nervous centres for the sexual organs and those for the digestive apparatus, we do not know. Derangements of the nervous system show themselves in frontal headache and depression of spirits amounting sometimes to melancholia.

Anæmia, with its characteristic train of symptoms, is the leading symptom in the haemorrhagic type (Olshausen).

Sterility is frequently present, and has been in certain cases the only symptom complained of. The secretion may destroy spermatozoa, may mechanically prevent them from passing upwards, or the villi of the fertilised ovum may be prevented from finding an attachment in the diseased mucous membrane. Again, the ovum is attached for a time but, from the imperfect formation of the uterine portion of the placenta, *abortion* takes place; repeated abortion is characteristic in chronic endometritis. A vicious circle is thus produced: as mentioned under etiology, endometritis frequently follows abortion; abortion, in its turn, frequently follows endometritis.

PHYSICAL SIGNS.

A. *Of Acute Endometritis.*

There is tenderness on pressure over the lower part of the abdomen, due to peritonitis which generally accompanies the acute form. On vaginal examination the cervix is found to be swollen and puffy, the os is dilated and feels velvety from eversion of the mucous membrane, the bimanual is unsatisfactory from sensitiveness to pressure. The speculum shows the vaginal portion to be congested, with catarrhal patches round the os and the follicles enlarged and sometimes containing pus. The leucorrhœal discharge already described is seen coming from the os uteri. The sound should not be used, as its introduction causes pain and sometimes hæmorrhage.

B. *Of Chronic Endometritis.*

Tenderness on pressure is not necessarily present, though we frequently find it as the result of complications—peritonitis, cellulitis, ovaritis.

On vaginal examination the vaginal portion of the cervix is normal, or has the characters described under cervical catarrh. The bimanual shows the uterus to be *enlarged;* it is soft and flabby so that its form cannot easily be made out, or of a firm consistence from chronic metritis.

The sound passes *beyond* the 2½-inch knob to a varying extent, and on withdrawal is frequently tinged with blood. Its introduction may be difficult from irregularities in the mucous membrane, and is sometimes painful. In some cases pain is complained of when the sound touches the fundus of the uterus, which some consider characteristic of endometritis. Routh has described a variety of the disease under the name "Fundal Endometritis," in which this is prominent: on forcible pressure of the sound against the fundus "absolute agony may result, which may produce vomiting, an hysterical faint or fit, sometimes a regular epileptic fit." The sound is most useful in demonstrating *irregularities of the mucous membrane*, and their recognition is of great importance: to detect these, the sound is held lightly between the finger and thumb and moved slowly backwards and forwards over the mucous membrane; a grating or catching sensation is felt when they are present. We must note however, as Olshausen points out, that the spongy irregularities may escape detection by the sound.

In the speculum we see, issuing from the os, the leucorrhœal discharge with the characteristics given above; usually it is mixed with that from the cervix. The appearances described under cervical catarrh are also frequently present.

DIAGNOSIS; DIFFERENTIAL DIAGNOSIS.

The curette is invaluable in diagnosis, especially when its use is followed by *microscopical examination* of the scrapings—the importance of which cannot be overrated.

This throws light on the etiological question, whether the endometritis be due to incomplete emptying of the uterus after *parturition.* In such a case, we find among the scrapings large decidual cells or fragments of the villi of the chorion in a state of fatty degeneration. It shows us the *character* of the *inflammatory changes.* Of these de Sinéty describes three forms on which we based our description of three pathological types of endometritis. The microscopic appearance of these (40 diameters) is given at figs. 186 to 189.

It enables us to differentiate endometritis from commencing malignant disease—*carcinoma* and *sarcoma.* In carcinoma, we see under the microscope abundance of epithelial cells of irregular form and with many nuclei (*v.* Chap. XXXIX.). In sarcoma we see under the microscope the typical round or spindle-shaped cells. The hæmorrhagic type of endometritis may readily be mistaken for sarcoma uteri, because 'it spreads in a diffuse manner, pre-eminently causes hæmorrhage, produces pain not at all or only late' (Olshausen). The microscope, however, settles the diagnosis. Care must be taken not to mistake the small-celled infiltration of the tissue (fig. 187) for round-celled sarcoma. The unstriped muscular fibre of the uterus may be present in the scrapings, but could only on hasty examination be mistaken for spindle-celled sarcoma. The latter are characterised by their larger size and oval nuclei (*v.* Chap. XLII.).

PROGNOSIS.

Endometritis is not a fatal disease in itself, though, when long protracted, it seriously affects the constitution and produces permanent ill-health. In cases of excessive hæmorrhage, the condition becomes grave.

The treatment is often protracted, and the patient should always be warned of this. The occurrence of conception will produce the most favourable conditions; and, if due care be taken to prevent abortion in the early months and in the management of the puerperium, we may hope for a cure.

When endometritis is associated with a strumous, tubercular, or syphilitic diathesis, it may baffle all our efforts.

TREATMENT.

A. Of Acute Endometritis.

Rest in bed, warm fomentations over the abdomen, and the free use of opium if there is much pain, form all the treatment required. Should the bowels not be moved freely before the attack, castor oil with an enema should be given since the loaded rectum presses injuriously on the inflamed uterus. Should the bowels not be loaded, the patient is not to be troubled with purgatives but rather kept under the influence of opium. If there is menorrhagia, ergot is required when the discharge is free, it is to be given hypodermically. Warm water injections should not be used until the acute stage is passed, the pain and other signs of inflammation have subsided, and the leucorrhœa is abundant.

B. Of Chronic Endometritis.

Prophylactic treatment is of great importance. A patient who is subject to endometritis, should guard against exposure during the menstrual period. When conception takes place, the practitioner should remember the liability to abortion, the importance of seeing that the uterus be thoroughly emptied after parturition, and that the patient take proper care during the puerperium; in the latter period ergot is beneficial.

We begin with hot water injections, and the administration of ergot; the liquid extract in doses of twenty drops in water three times a day, increased to thirty at the menstrual period, is the most convenient form.

If the uterine cavity be enlarged so that the sound moves freely within it, if there be roughness of the endometrium, or if there has been a recent miscarriage or confinement, we employ *the curette followed by the application of carbolic acid.* In the last class of cases the cause of the endometritis has been the incomplete separation of the placental villi; if treated while still recent, such cases furnish the most satisfactory instances of an immediate and complete cure.

Curetting should not be performed while active cellulitis or peritonitis is present. The fixing of the uterus by adhesions or cicatrisation does not contra-indicate the operation, though they render it more difficult through preventing the uterus from being drawn down by the volsella; when these are present, undue traction must not be made. The time selected for operation is a week after a menstrual period; when the discharge is continuous, the period is indicated by increase in amount.

Curetting of the Uterus with application of Carbolic Acid. The following instruments are necessary:—

Sim's or Battey's speculum,
Three or four sounds dressed with cotton wool,
Volsella,
Simpson's modification of the dull-wire curette,

Crystals of carbolic acid liquified,
Cotton wadding and glycerine,
Mackintosh.

Chloroform is not necessary unless the patient be nervous.

The sounds should be covered with a thin layer of cotton wool, extending almost to the knob (fig. 190). The sound is dressed as follows:—A film of cotton wadding is laid on the palm of the left hand, the last two and a half inches of the sound are moistened and pressed firmly on the cotton wadding, the left hand is closed over it, the sound is turned twice or thrice round within the shut hand till the cotton wadding becomes tightly rolled on. The dressing must bite the sound firmly so that it may not come off within the uterine cavity, and must not be too thick to be easily carried in. To remove the cotton wadding afterwards, the dressing is unrolled under water.

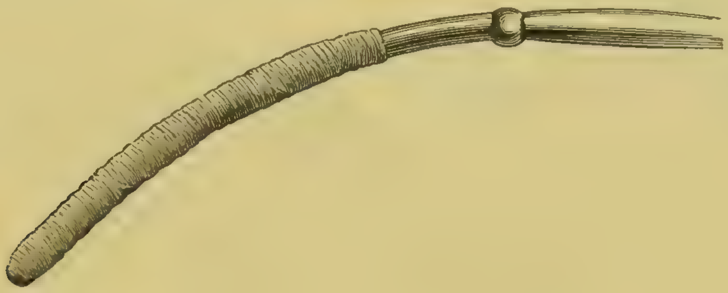


Fig. 190.

Sound dressed with wadding for the application of carbolic acid.

Thomas's dull-wire curette is the most serviceable, because from its small size it can be used without previous dilatation and from its flexibility it can be curved to suit the form of the uterine canal. A. R. Simpson has distinctly improved it by adding a knob at the two and a half inches, which informs the operator where the end of the curette is. The crystals of carbolic acid are kept in stoppered bottles, at the ordinary temperature a portion remains liquid; iodine, strong nitric acid, or chromic acid may be substituted for it.

The patient is placed semiprone; Sim's speculum is passed and held by an assistant who with the left hand draws back the upper labium (fig. 191)—if there be no assistant, Battey's speculum is used and fixed to the mattress; the vagina is washed out with carbolised water. The anterior lip is laid hold of by the volsella and drawn downwards, the volsella being steadied with the fingers of the left hand; the curette is taken in the right hand, dipped in carbolised oil (1-20), and carried into the uterine cavity (fig. 191). The anterior wall of the uterus is first scraped, from the fundus downwards; only slight pressure on the instrument is made, unless it be felt to slip over the irregularities of the mucous membrane without removing them; the detached fragments are brought down to the cervix with a raking motion, and set aside for microscopical examination: the posterior wall is scraped in the same way. A sound, dressed with dry cotton wadding, is passed to clear away the blood and mucus; the same process is immediately repeated with a second, and with a third if necessary. A reserve sound, previously dipped in the carbolic acid so as to be ready for use, is carried in immediately after the last of these has been withdrawn; if there is much bleeding or the uterine cavity be large, a second application should be made; our aim is to apply the carbolic acid to the whole of the raw surface, without its being diluted with blood or mucus. The volsella being withdrawn, a pledget of cotton wadding soaked in glycerine is placed in the upper part of the vagina so as to embrace

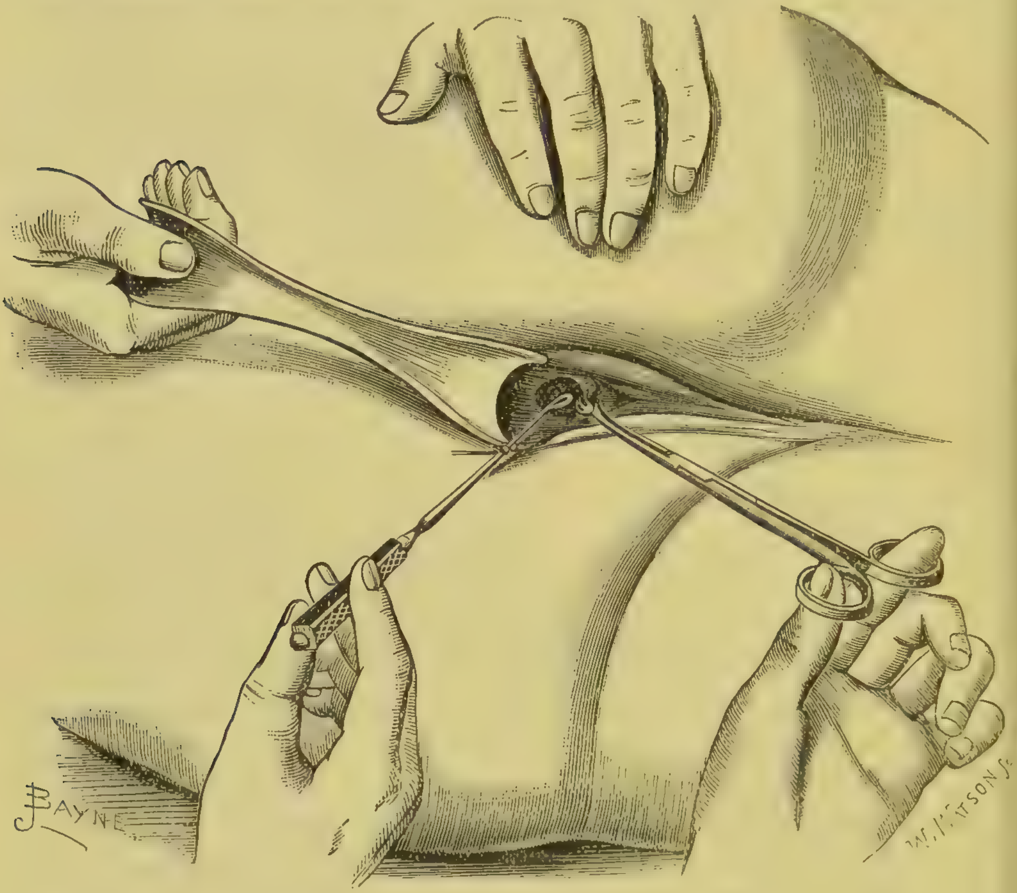


Fig. 191.

Uterus drawn down with the volsella and curette in position. The speculum is held and the labium drawn upwards by an assistant. The operator's hands are crossed. (A. R. Simpson.)

the cervix; this prevents the carbolic acid from running down into the vagina.

The patient keeps her bed for a week after the operation, the pledget having been removed on the second day. Special care should be taken at the next menstrual period.

Applications without a previous curetting are indicated in cases where there is no history of recent parturition or where no irregularities are detected by the sound. (In endometritis fungosa, which specially requires the curette, no irregularities are detected by the sound—Olshausen.) In all other cases the preliminary use of the curette is a distinct advantage, as it removes the fungosities and thus allows the caustic to act more efficiently.

Atthill advocates the use of strong nitric acid, and the preliminary dilatation of the cervix with tents so as to allow a thicker dressing of the sounds and more abundant application of the acid. He uses an intra-uterine speculum of vulcanite which is passed within the cervix; this prevents the acid from acting on the cervical canal.

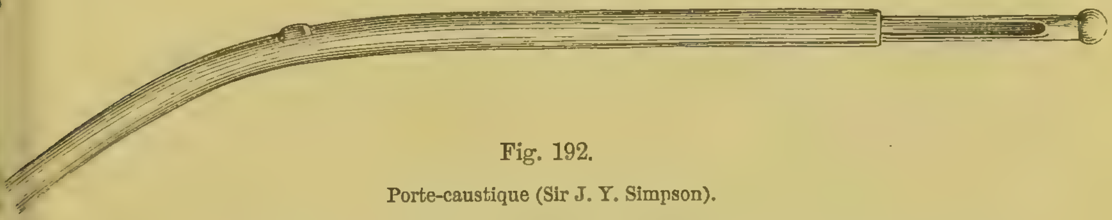


Fig. 192.

Porte-caustique (Sir J. Y. Simpson).

The application may be made in a *solid form*, of which the best is nitrate of silver. This is employed as follows: the nitrate of silver is fused in a water-glass over a spirit flame; a probe with a roughened end is dipped in this and the film allowed to cool, and then dipped again repeatedly till several layers are deposited. Sir James Simpson applied the nitrate of silver in powder on the porte caustique represented at fig. 192. The simplest way is to carry an ordinary quill with a nitrate of silver point into the cavity of the uterus; it may be passed in and withdrawn again, or held there till the point melts off; Credé of Leipsic has got very good results from this mode of treatment. Barnes has devised an ointment positor for introducing ointments or fluids; he applies the iodide of mercury ointment in this way, and also tincture of iodine on a sponge.

The importance of constitutional treatment must not be forgotten. The bowels should be moved regularly by saline aperients; the aloes and iron pill is also useful. The preparations of quinine, iron, and strychnine, are valuable in improving the tone of the nervous and digestive systems.

Cold baths and sea-bathing aid greatly in strengthening the constitution. The water of certain mineral springs, such as Ems and Kreuznach, seems to have a special action on the uterine as well as on other mucous membranes. The regular diet and exercise required at these baths have also, no doubt, their beneficial effect.

The diathesis—strumous, tubercular, or syphilitic—should not be forgotten. In them, the treatment must from the first be constitutional.

Intra-uterine injections. Applications to the interior of the uterus are also made in the form of a fluid injected by a syringe. The nozzle of the latter is shaped like a sound, so that it may be passed into the uterine cavity; the barrel is of glass, and is graduated (like a hypodermic syringe) so that the quantity injected (not more than a few minims) is exactly known. The solutions used are carbolic or chromic acid, tincture of iodine or perchloride of iron, nitrate of silver, and sulphate of iron or copper. The cervix must be well dilated, to allow the fluid to escape readily past the nozzle of the syringe. To facilitate this reflux, syringes have been devised with a double canula. Injection of fluid *into the non-puerperal uterus* is not unattended with risk (*v.* p. 175), and the fact that we have the equally effective and perfectly safe method of intra-uterine medication described above renders it unnecessary. As a means of treating endometritis it is condemned by the general opinion of gynecologists in this country and America; in France and Germany, however, it is extensively practised. For further details of this method the student may consult the following references: Klemm—"Die Gefahren der Uterininjection," Leipzig 1863; Cohnstein—"Beiträge zur Therapie der chronischen Metritis," Berlin 1868; Leblond—op. cit.; and Hegar und Kaltenbach—op. cit., S. 104.

CHAPTER XXX.

METRITIS, ACUTE AND CHRONIC: SUBINVOLUTION.

LITERATURE.

Barnes—Op. cit., p. 507. *Bennet, J. H.*—Practical Treatise on inflammation of the Uterus: London, 1853. *De Sinéty*—Op. cit., pp. 315 and 351. *Gallard*—Traitement de la Métrite Chronique. Bull. gén. de thérapeut, etc., 1879, T. XCVII. 4—12 liv. *Guérin*—Ann. de Gyn., 1878, Tom. II. p. 9. *Klob*—Op. cit., S. 124. *Scanzoni*—Die chronische Metritis: Wien, 1863. *Schrœder*—Op. cit., S. 84. *Simpson, Sir J. Y.*—Op. cit., p. 585. *Thomas*—Op. cit., p. 307.

Definition.—Inflammation in the muscular coat of the uterus leading, when chronic, to increased formation of connective tissue.

ACUTE METRITIS.

PATHOLOGY.

The uterus is enlarged and may be of the size of a goose's egg; it is thickened, specially antero-posteriorly, and of a doughy consistence. The peritoneal surface is usually covered with lymph.

On section the muscular wall is thickened, but soft and pulpy; the cut surface is of a bright red colour, shows the veins to be engorged, and yields on compression a yellowish red exudation. The mucous membrane is thickened and vascular, but the cavity of the uterus is not altered in size. Microscopically, the muscular bundles are infiltrated with pus corpuscles.

ETIOLOGY.

Acute metritis is produced by extension of inflammatory action from the mucous or serous lining of the uterus to the intervening muscular tissue. It occurs most commonly as part of the general inflammation produced by absorption of septic matter during the puerperium. It also arises from exposure to cold at a menstrual period—the active congestion passing readily into acute inflammation, from gonorrhœal infection and immoderate sexual activity.

Frequently it is the result of surgical interference :—careless use of sound, intra-uterine injections, pessaries and sponge-tents; scraping the uterus for the removal of submucous fibroids, operations on the cervix; and even after vaginal injections of too hot or too cold water.

SYMPTOMS.

There is fever and general constitutional disturbance varying with the intensity of the inflammation. The onset may be marked with rigors. There is a sensation of fullness, weight, and burning heat in the pelvis; pain in the hypogastric and sacral regions, aggravated on movement of the body or emptying the bladder and rectum; nausea and vomiting, diarrhœa and tenesmus of rectum and bladder.

Menstruation is suppressed in those cases where the metritis is occasioned by exposure to cold at the menstrual period. In other cases, it is diminished in amount; exceptionally, there is menorrhagia.

PHYSICAL SIGNS.

There is tenderness on pressure in the hypogastric region. On vaginal examination, the vaginal walls are hot and dry, the cervix is swollen and movement of it causes pain; there is tenderness in all the fornices. The bimanual examination cannot be made on account of the pain and the resistance of the abdominal walls; if the patient be put under chloroform, the uterus will be felt to be enlarged but freely movable unless fixed by old adhesions (fig. 206). The sound should not be used, as it causes hæmorrhage from the vascular mucous membrane.

PROGRESS AND TERMINATION.

The acute symptoms do not last usually more than a week. The fever and pain diminish; there is less heat in the pelvis and vagina, and leucorrhœal discharge becomes free. As complications, there may be catarrh of the bladder, rectum, or vagina.

The acute *usually* passes into the chronic stage to be immediately described; though *sometimes*, under proper treatment and care, there is resolution with absorption of the exudation; rarely does it terminate in abscess formation. Circumscribed abscesses in the uterine walls—recorded by Scanzoni, Reinmann, Bird, Ashford, Schrœder, Macdonald, and others—are sometimes produced and burst into the uterus itself; or adhesions may form and perforation take place into the bladder, vagina, rectum, and intestines, or even through the abdominal walls.

DIAGNOSIS.

The diagnosis that there is acute metritis and *nothing more*, is a refinement to which few would lay claim. But if the symptoms and physical signs are as described above, if the uterus be freely movable and no deposit is felt in the fornices, we may conclude that acute metritis is the prominent lesion. The possibility of abscess-formation should be kept in view.

PROGNOSIS.

The *immediate result* will depend on the extent to which the peritoneum is involved. Even when the attack is not severe, the liability to pass into a chronic intractable condition makes us guarded in giving an opinion as to *complete recovery.*

TREATMENT.

If the metritis is supposed to be due to a septic cause, the first measure indicated is the *removal of that cause.* Thus if it come on during the puerperium, if the lochia are fœtid and we suspect that a portion of the placenta has been retained, the uterine cavity should be washed out with an injection of 1 to 40 carbolic solution. Great care must be taken not to introduce air with the injected fluid.

In all cases of metritis, the inflamed uterus must be kept *at rest.* This is done by keeping the patient recumbent. The bowels are evacuated by an enema—not by purgatives—followed by a morphia suppository. Pain is relieved by warm fomentations, to which turpentine may be added, applied over the lower part of the abdomen; but if it be severe, the patient should be kept under the influence of opium as already described in the treatment of Pelvic Peritonitis. If the temperature be above 100°, quinine should be given—10 grains every two or three hours—till it falls. The sulpho-carbolate of soda is useful in some cases.

CHRONIC METRITIS.

SYNONYMS. — Chronic parenchymatous inflammation (Scanzoni), Diffuse proliferation of connective tissue (Klob), Infaret (Kiwisch), Areolar hyperplasia (Thomas).

There has been great divergence of opinion among gynecologists as to the term which should be applied to the changes occurring in chronic metritis. Virchow describes the process as a hyperplasia of fibro-muscular tissue, and places chronic metritis alongside of fibroid tumours of the uterus. Klob classes it among the new formations, and characterises it as "die diffuse Bindegewebswcherung"—"diffuse proliferation of connective tissue." Thomas calls it "Areolar Hyperplasia," and Noeggerath has suggested the term "diffuse *interstitial* metritis."

From a *pathological point of view* the term "metritis" is incorrect, because there has never been demonstrated a chronic inflammation of the muscular fibre of the uterus. The morbid process described as chronic metritis consists in an *increase of connective tissue* out of proportion to that of the muscular fibre, which remains normal or is but slightly increased in quantity. We are not yet in a position to propose a term resting on a sure pathological basis; to do this would require a complete knowledge of the pathological changes, which has not yet been attained. We prefer to retain the term "chronic metritis."

From a *clinical point of view*, this term is very convenient, including a variety of cases of different origin but presenting the same clinical features on examination.

It may be objected that to apply the term "chronic inflammation" to *the process* is misleading, as it implies a previous acute stage which is rarely present; the process would be more correctly described as an increased connective-tissue formation dependent on long continued hyperæmia. But the term chronic inflammation is applied to the process producing similar changes in other organs, as cirrhosis of the liver; chronic metritis produces, in fact, cirrhosis of the uterus.

We have brought "Subinvolution of the uterus" under this head, though in other English text-books it is treated as a separate lesion. The term subinvolution is *etiological* and simply expresses one mode, the most important one, in which the condition to be described is produced. *Apart from the history*, it is not possible to diagnose between a subinvoluted uterus and one enlarged by chronic metritis alone. Further, the condition of subinvolution is maintained by the process of chronic metritis, that is, by the formation of connective tissue which takes the place of the fattily-degenerated muscular fibre. Finally, the treatment is the same in both cases.

PATHOLOGY.

The condition of the uterus depends on the duration of the disease. At an early stage (as in cirrhosis of the liver) the organ is enlarged, hyperaemic, and soft; at a later period it is indurated, anaemic, and hard. The peritoneal surface is of normal colour, or shows here and there patches of extravasated blood. The enlargement is uniform, so that the shape of the uterus is not altered.

On section, the tissue is soft and hyperaemic in the early stage; firm, cartilaginous, and of a whitish colour (from the compression of the capillaries by the cicatricial tissue) in a later stage. The uterine walls are increased in thickness. The uterine cavity is increased in size and, from the stiffening of the walls, more roomy.

"In the first period," says de Sinéty,* "the dominant lesion is the presence in great number of embryonic elements throughout the whole thickness of the muscular wall. These elements are met with specially round the blood-vessels or form islands of variable dimensions which are more or less apart." The second period is characterised by two changes; (1) Marked dilatation of the lymphatic spaces, and (2) a localised hyperplasia of the connective tissue round the blood-vessels (fig. 193). The sclerosis, for such it may be called, differs from a similar change in the kidney or liver in the fact that the formation of connective tissue is localised round the blood-vessels. In the case described by de Sinéty, he says that it was difficult to say whether the muscular tissue was normal or diminished in quantity.

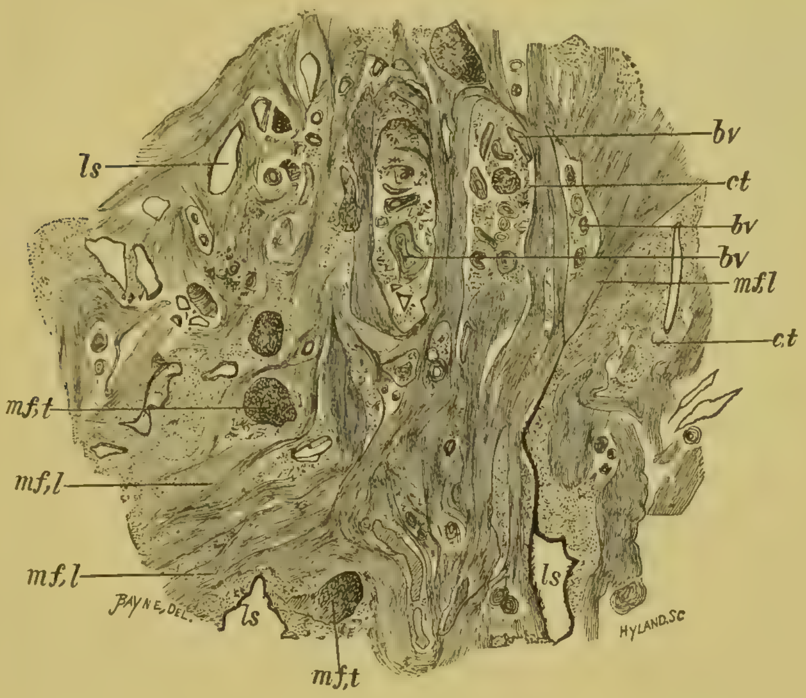


Fig. 193.

Section of the uterine tissue in a case of chronic metritis $\frac{40}{1}$. *ct* connective tissue round the blood vessels *b v*; *ls* dilated lymphatic spaces; *mfl* muscular fibre cut longitudinally; *mft* muscular fibre cut transversely (de Sinéty).

---

* Gynecologie, p. 354.

Snow Beck * also describes the presence of "an increased amount of round and oval globules, with amorphous tissue in the uterine walls." The increase in the size of the uterus is due to the presence of the soft tissue rather than to an increase in the muscular fibre.

On the other hand, Finn † gives the following result of his investigation of the pathology of chronic metritis :—The muscular fibres are increased in length and breadth and number, though their disposition is not altered; the amount of connective tissue is relatively diminished. Finn's observations have not been supported by any other investigators.

We may therefore sum up the microscopic changes of the second stage as an increase in the amount of connective tissue with a relative and perhaps absolute diminution in the muscular fibre.

ETIOLOGY.

The causes of chronic metritis may be arranged under two heads :—

A. Causes which operate through interference with the normal involution of the puerperal uterus;

B. Causes which operate through the production of repeated or protracted congestion of the uterus.

A. Causes which operate through interference with the normal involution of the uterus.

(1.) Retention of portions of placenta, membranes, or blood-clot in the uterus;
(2.) Lacerations of the cervix uteri;
(3.) Pelvic inflammations, occurring after labour;
(4.) Rising too soon after delivery;
(5.) Non-lactation;
(6.) Repeated miscarriages.

In the process of involution there are two factors, the fatty degeneration of the muscular fibre and the removal of the products of this degeneration. The condition of permanent enlargement or subinvolution is not due to the non-degeneration of muscular fibre, but to the substitution of connective tissue for the products of this degeneration. This seems to be the reason why the process of chronic metritis is met with more frequently in those who have borne children; if there be a tendency to hyperaemia leading to connective tissue formation in the uterus, the most favourable circumstances for such formation occur during the process of involution (Thomas).

---

* Lond. Obst. Trans., vol. xiii., p. 239.

† Centralblatt f. Gyn., 1868, S. 564.

Any source of irritation in or beside the uterus leads to chronic metritis; in this way we explain the effect of the *retention of portions of placenta or membranes.* An extensive *laceration of the cervix,* Emmet says, favours subinvolution for a similar reason. Continued *cellulitis or peritonitis* acts in the same way, or through interference with the circulation. If the patient *rise too soon,* the increased weight of the non-involuted uterus leads to passive congestion and formation of connective tissue. Passive congestion will, on the other hand, be diminished by whatever produces uterine contractions; the physiological stimulus of suckling, excited reflexly through the mammæ, favours involution; in *non-lactation* this stimulus is absent. *Abortions* are an important cause; because patients do not take so much care of themselves as after a full-time labour, and the stimulus of lactation is absent. After abortion conception readily takes place before the uterus has returned to its normal size, and this favours a re-occurrence of abortion.

B. Causes which operate through production of repeated or protracted congestion.

(1.) Displacements of the uterus;
(2.) Pressure of the distended rectum or bladder, or of tumours in or near the uterus;
(3.) Causes producing increased flow of blood to the uterus; as endometritis, too free use of caustics, and excessive sexual activity.

SYMPTOMS.

In the great proportion of cases, the patient *dates her suffering from a confinement;* frequently, there is a history of repeated abortions. The patient finds, on rising after the puerperium, that she does not regain her former strength. There is weakness in the back amounting in more severe cases to pain, a sensation of weight and bearing-down in the pelvis and of want of power in the limbs.

There is *leucorrhœa,* according to the extent to which the mucous membrane is affected.

Menstruation is irregular and often increased in frequency and quantity, though this is more characteristic of endometritis.

The *reproductive function* is variously affected. Before the structure of the uterus has become permanently altered, pregnancy followed by early *abortion* may repeatedly happen. The cause of the abortion is probably the alteration which is taking place in the structure of the mucous membrane and muscular tissue, rendering it unfitted for the development of the placenta; after an abortion, the conditions are peculiarly favourable for a second conception even before the uterus has had time to undergo involution; an excessive development of connective tissue gradually renders the uterus incapable of involution, and thus the condition of subinvolution is perpetuated. Should the pregnancy go on to full time, the presence of an undue proportion of connective tissue in the uterine wall leads in the third stage of labour to atony of the uterus and retention of the placenta; see an interesting case of this reported by Kaschkaroff,* who gives the result of his microscopic investigation. After the condition has existed for some time, there is *sterility.* This is due not so much to the changes in the uterus itself, though the leucorrhœa may prevent fertilisation, but to the ovaritis or pelvic peritonitis which is usually superadded; ovulation may be prevented by change in the structure of the ovary or by its being bound down by adhesions; the Fallopian tubes may be obstructed by cicatricial contractions.

The general constitutional derangements are very important, and it is on account of these that the patients usually seek advice. Chronic metritis is the most important of all the diseases of women; the suffering of the patient in cases of displacement of the uterus, is not due so much directly to the displacement as to the chronic inflammation secondary to it.

PHYSICAL SIGNS, DIAGNOSIS.

The uterus is *equally* enlarged; there is no alteration in its form. The character of the enlargement is best understood by contrasting it with that due to pregnancy. In the second or third month of pregnancy, there is antero-posterior broadening of the uterus; the vaginal finger comes on the anterior wall springing out from the cervix; the abdominal hand feels the rounding out of the fundus, combined with a softness which prevents us from distinctly defining its outline. In chronic metritis the vaginal finger does not feel any bulging of the anterior wall, and the abdominal hand recognises the fundus to be uniformly thickened; the outline of the latter may be felt with unusual distinctness through the greater firmness of the uterine tissue.

The enlarged uterus may be in its normal position, and freely movable or fixed by adhesions; it is often retroflexed.

The sound passes more than the 2½ inches; it passes *readily*, and is felt to be freely movable in the roomy uterine cavity.

---

* Centralblatt für Gynäkologie, No. 5, 1879.

DIFFERENTIAL DIAGNOSIS.

The conditions which are most liable to be confounded with chronic metritis are *early pregnancy* and *small fibroid tumours.*

In a case of early pregnancy, the "having passed a period" will put us on our guard; some patients, however, menstruate after conception. Discolouration of the vagina points to pregnancy, but is often not marked. The softening of the cervix is a more reliable sign, less reliable should pregnancy occur in a uterus which has undergone changes of chronic metritis. Our only guide is the bimanual examination, which shows us the change in the form and consistence described above. When the abdominal muscles are resistent, the finger can recognise per rectum the bulging and softness of the posterior uterine wall. The interesting question suggests itself in this connection, how soon it is possible to recognise the changes in the uterus peculiar to pregnancy. *How soon can we diagnose pregnancy?* Before auscultation was known the first reliable signs were fœtal movements; the date at which the mother first recognised these varied indefinitely. Auscultation gave us an earlier and more reliable indication in the sounds of the fœtal heart; these cannot be heard before the fourth month. The bimanual examination enables us to detect pregnancy from the eighth to the tenth week. We have under very favourable circumstances diagnosed it at the fifth week, and the subsequent history has confirmed our diagnosis.

For the differential diagnosis of chronic metritis from small fibroid tumours, we refer the student to the "Diagnosis of small fibroid tumours" (Chap. XXXIV).

TREATMENT.

Our first object is to diminish the passive congestion of the pelvic organs. The patient should be instructed to lie down for a few hours every day. Sedentary occupations or those that require the patient to stand for a long time in one position should be avoided. While enjoining a certain amount of rest, we must remember that rest becomes injurious when it interferes with nutrition. A certain amount of exercise, especially in the open air, should be as emphatically prescribed as a certain amount of rest.

Passive congestion is also diminished by giving local support to the uterus by a Hodge pessary; where the vagina is roomy, a soft ring pessary sometimes answers better.

The pelvic circulation is stimulated by vaginal injections; tepid water will generally be found to be the most available; cold water is a more effectual stimulus, but few patients can stand it. The vaginal injection should be employed just before going to bed; the douche is preferable to Higginson's syringe (*v.* page 137). The injection should be continued from ten minutes to a quarter of an hour. It is a decided advantage to have the douche given with the patient in the *dorsal posture*, as Gallard recommends. Occasional warm baths are useful in some cases; when the patient is in the bath, the vaginal douche can be used at the same time with greater freedom and effect. A cold hip-bath every morning is the best stimulus to the circulation. *Medicinal baths* have a peculiarly beneficial effect in chronic metritis. Amongst those the first place has always been held by Kreuznach, the waters of which are specially rich in bromides and iodides. The baths at Kissingen are rich in carbonates, and are of a lower temperature than those at Wiesbaden and Baden-Baden which contain a smaller proportion of salts.

Further, the *drinking* of medicinal waters is also beneficial. The mineral springs at Ems and Vichy have, from their action upon the mucous membrane, always had a great reputation for the treatment of chronic uterine inflammation. Where there is much catarrh, they are specially serviceable. In scrofulous and chlorotic individuals, the advantage of waters which are rich in salts of iron is evident. Comparatively few of our patients, however, will be able to enjoy the luxury of a course of treatment at one of these watering places; but much benefit will be derived from change of air to the sea-side, or to the regular regime and cheerful surroundings of a hydropathic.

Attention to the action of the bowels is all important. Accumulations in the rectum and sigmoid flexure of the colon favour passive congestion, and interfere with the appetite and digestion. The mineral waters—Friedrichshall, Carlsbad and Hunyadi Janos—are the best aperients.

The Carlsbad salts are specially useful in bilious patients; a teaspoonful should be dissolved in a tumblerful of water and drunk in repeated sips during the morning. Friedrichshall and Hunyadi Janos waters act best mixed with an equal amount of hot water; their dose varies from a wineglassful to a tumblerful. A good substitute for these waters is the tonic and aperient prescription given on page 185.

The iodide and bromide of potassium are given internally, as recommended at page 183.

Great care, and in some cases complete rest, should be enjoined at the menstrual period. As exacerbations usually occur at these times, a great deal is done towards a cure by prophylactic measures in regard to this.

Of local treatment the most important is *counter irritation* by occasional blistering or repeated application of iodine or of croton oil to the iliac regions. French gynecologists recommend the application of the blistering fluid to the cervix; we have had no experience of this method. Thomas speaks highly of it, and practises it in the following way. A large cylindrical speculum is passed, and the cervix cleansed and dried with a pledget of cotton. The preparation of vesicating collodion, made with acetic acid, is painted in two or three coats over the whole of the vaginal portion; after it has dried, a stream of cold water is applied to wash off any superfluous collodion. In eight to twelve hours there is a free discharge of serum. The patient remains quiet for some days, and uses occasional warm water injections; a pledget of cotton wadding soaked in glycerine is applied afterwards. Many gynecologists apply iodine to the cervix and roof of the vagina; Scanzoni recommended a solution of 4 gr. of iodide of potassium in 30 m. of glycerine. The simple tincture of iodine, or a solution of equal parts of iodine and glycerine, may also be applied in this way. *Local depletion* by scarification or leeches, as described under endometritis, is less frequently employed than formerly.

In speaking of Emmet's operation, we mentioned that it was sometimes followed by diminution in the size of the uterus. Carl Braun* has shown that after *amputation of the cervix* for hypertrophy the uterus sometimes undergoes changes which resemble those which occur physiologically in the puerperal uterus. Martin of Berlin strongly recommends the amputation of the posterior lip; in a paper read before the German Scientific Association at Cassell, he gives the results of the operation in 72 cases in all of which the uterus was stimulated to undergo subinvolution.

Dr Weir Mitchell † has introduced a method of treatment of chronic uterine disease which consists of *complete rest associated with a fattening diet and massage of the body generally.* The patient is isolated from her friends and subjected to the following regime for a period varying from one to three months. Milk, nutritious soups, eggs, cod liver oil and other fattening foods are given by an attendant every few hours. All voluntary motion is forbidden. Friction of the skin, massage of the muscles of the body generally, and passive movements of the limbs are made by the attendant as often and as long as the condition of the patient will allow; this stimulates the circulation and favours absorption of nourishment with a minimum expenditure of strength.

Uterine massage. Massage of the uterus itself as a means of treating chronic metritis was introduced by Brandt[*] of Stockholm. The difficulty of carrying it out has prevented its being as yet extensively tried, but it has been followed with such good results in certain cases that it promises to become a recognised mode of treatment. Reeves Jackson,[†] who has found it successful in certain cases, rightly draws attention to the fact that it will not be effective when "the stage of induration has been reached." In performing massage, we begin by manipulating the skin of the abdomen; after the patient has got accustomed to this, we knead the uterus through the abdominal walls: if the uterus is so large that it reaches above the brim, this "abdominal massage" may be efficient; if it be smaller, two fingers are passed into the vagina to counteract the abdominal hand.

---

* Zeitschr. d. Ges. d. Wiener Aerzte, 1864, s. 43.

† Fat and Blood and how to make them.

---

[*] Nouvelle Methode gymnastique et magnetique pour le traitement des maladies des organes du bassin et principalement uterinés: Stockholm, 1868.

[†] Uterine Massage as a means of treating certain forms of enlargement of the womb: Am. Gyn. Trans., 1880.

CHAPTER XXXI.

DISPLACEMENTS OF THE UTERUS: ANTEFLEXION; ANTEVERSION; RETROVERSION; RETROFLEXION.

LITERATURE.

Barnes—Diseases of Women : London, 1878, p. 679. *Campbell, H. F.*—American Gynecological Transactions, Vol. I., 1876. *Duncan, Matthews*—On the Displacements of the Uterus : Edinburgh, 1854. *Emmet*—Gynecological Transactions, 1876. *Fritsch*—Die Lageveränderungen der Gebärmutter, Billroth's Handbuch : Stuttgart, 1881. *Hart*—The Structural Anatomy of the Female Pelvic Floor. *Hewitt Graily*—The Mechanical System of Uterine Pathology : London, 1878. *Mundé*—The Curability of Uterine Displacements : Amer. Jour. of Obst., Oct. 1881. *Routh*—London Obst. Trans., Vol. XV., p. 252. *Ruge*—Zeitschrift für Geburtshülfe und Gynäkologie, 1878, Band II., p. 24. *Schrœder*—Op. cit., S. 140. *Schultze, B. S.*—Volkmann's Sammlung klin., Vorträge, 50. *Simpson, Sir J. Y.*—Op. cit., pp. 253, 245, and 764. *Skene*—American Jour. of Obst., Vol. VII., 1874, p. 391. *Thomas*—Op. cit., pp. 363, 408. *Van de Warker*—The relation of symptoms to Versions and Flexions of the Uterus : Amer. Gyn. Trans., 1879, p. 334.

As the uterus is a movable organ within the pelvis, it is subject to various changes of *position* ; as it is composed of a soft pliable tissue, it is liable to alterations of its normal *curvature*. Both of these changes are described in English text-books as "displacements," although, strictly speaking, this term should be applied only to the former.

The normal form, position, and relations of the uterus have been already described (see Chap. II).

The uterus is constantly exposed to forces producing a temporary displacement. In front there is the *bladder*, the dilatation of which displaces the uterus backwards and somewhat upwards (fig. 44). Behind there is the *rectum*, which normally should have little influence on the position of the uterus ; but, owing to inattention to its regular evacuation, it is frequently over-distended and thus acts as a displacing cause operating from above and behind. Above there is the *abdominal pressure*, which is constantly acting on the uterus especially during inspiration. One has only to watch the movements of the anterior vaginal wall during respiration to see that this factor is always operating. Its action is of course increased by whatever increases the intra-abdominal pressure, that is, by any straining efforts which bring the abdominal muscles into play. Below there is the *pelvic floor*, which has a constant action in supporting the uterus against the abdominal pressure.

We must distinguish between *physiological* and *pathological* displacements. The former is transient, and passes away when the cause has ceased to operate; the latter is persistent, and produces permanent alterations in form, position, and structure. It is difficult to draw the line between those two. The pathological condition is frequently due to simple overstepping of the limits of the physiological. Thus the carrying of the uterus backwards into a retroverted position by the distention of the bladder is physiological, while its remaining permanently in that position is pathological.

It is evident that the uterus can be displaced in at least three ways: *first*, the different parts of it may alter their position relative to one another; *second*, it may rotate round the transverse axis; *third*, the organ may be displaced as a whole. Any great rotation round the vertical axis is prevented by the attachments of the uterus.

1. Alteration in the relative position of body and cervix constitutes *flexion* of the uterus, in which there is a change in the curvature of the long axis, *i.e.*, in the direction of the uterine canal.

2. Rotation of the organ round an imaginary transverse axis constitutes *version* of the uterus.

3. Displacement of the organ as a whole, although frequently observed, has not been described in English works by a precise term. We might use the term *position* with the suitable prefix. Thus when the uterus lies "back as a whole" in the pelvis, it might be described as "a retroposition" or as "retroposed" (*Germ.*, retroponirt).

The uterus, in its normal condition, is anteflexed, anteverted, anteposed—placed as far forward as the bladder will allow.

Various deviations from the normal condition may occur.

(*a.*) There are three possible changes in *flexion*. To understand these, suppose the direction of the cervix to be fixed. The uterine axis may be (pathologically) *ante*flexed (fig. 194 *a*), so that the normal curvature is increased; this is sometimes associated with retroposition. The axis may become *straight*, as occurs in so-called anteversion (fig. 194 *b*). It may also be *retro*flexed (fig. 194 *c*); this condition occurs rarely by itself, but associated with retroversion it is a common displacement.

(*b.*) *Version* round a transverse axis is either forwards or backwards.

An increase of the normal *ante*version (fig. 195 *a*) is not frequent; the condition generally so described is more often the result of straightening of the uterine axis (fig. 194 *b*). *Retro*version occurs alone (fig. 195 *b*), and is further always present where there is retroflexion (fig. 195 *c*). The body of the uterus may also be drawn to either side of the pelvis, the cervix being directed to the opposite side. This constitutes *lateri-version.* Normally, the uterus is slightly lateri-verted to the right.

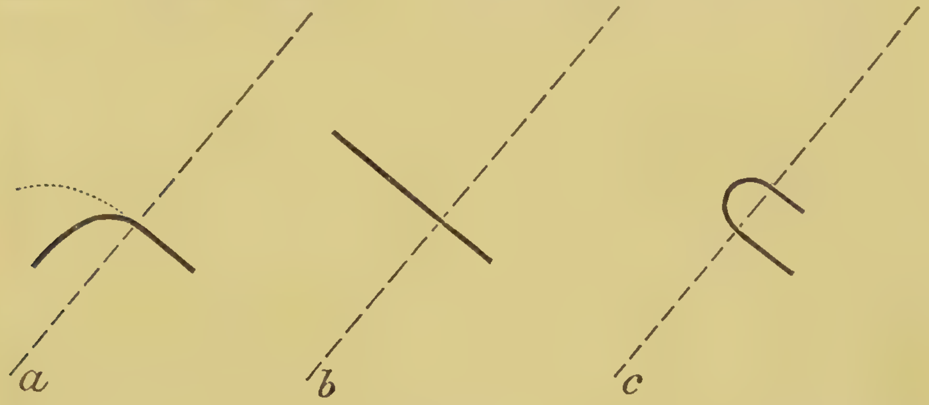


Fig. 194.

Diagrammatic scheme of flexions. The broken line represents plane of brim: the dark line the axis of uterus; the dotted line its normal curvature. For letters see text.

(*c.*) Change in *position*, or displacement of the organ as a whole, is upwards, downwards, backwards, or to either side. *Upward* displacement occurs in pregnancy or whenever there is a tumour present which lifts the uterus out of the pelvis; it is of little pathological significance. *Downward* displacement occurs in prolapsus uteri, and will be discussed under that head (Section VII. Affections of the Pelvic Floor). A change in position *backwards* or to *either side* is produced by pressure or by traction; when produced by cicatricial contraction, these are the most important conditions we have to deal with.

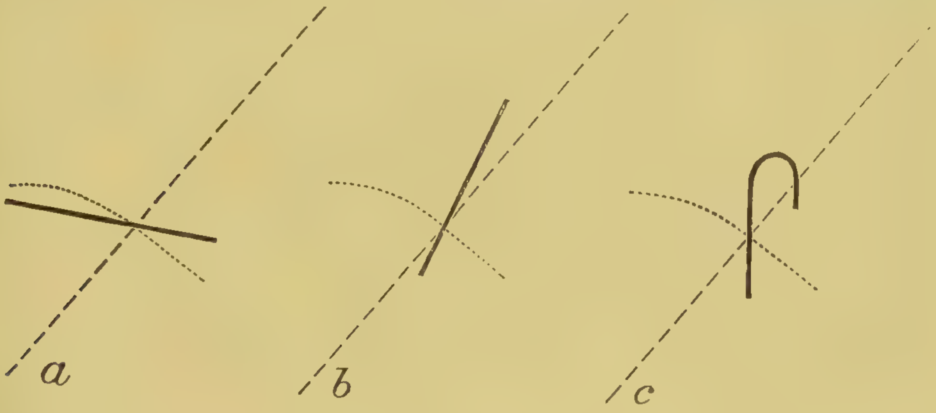


Fig. 195.

Diagrammatic scheme of versions.

We have considered from a theoretical point of view the variations in flexion and version in detail, to enable the student to understand clearly what these terms mean. Too much importance should not be attached to slight variations; the student need only note the following points.

1. The normal curvature may be exaggerated—anteflexion.

2. The uterus may be straightened, the normal angle becoming less pronounced and thus throwing the cervix more backwards—anteversion.

3. The uterus may be directed backwards—retroversion.

4. It may not only be turned backwards but the normal angle may be reversed, the fundus being bent backwards instead of forwards—retroversion + retroflexion.

5., The uterus may be displaced as a whole, usually by cicatricial contraction. This last condition is the most difficult to treat.

The *etiology* of flexions and versions is a subject on which little definite is as yet known. This is the more unfortunate as a knowledge of etiology is of first importance in rational treatment. We should recommend the student to enquire carefully into the origin and duration of the symptoms; and on making his physical examination not to be content with ascertaining merely that there is a displacement, but to find out if possible the cause. This will guide him both in prognosis and treatment; it will indicate what cases he may hope to cure, and what cases he should leave alone. A knowledge of etiology enables him to prevent the occurrence of displacements, as, for example, of retroversion in the puerperal condition; and in this case prevention is better than cure.

The *symptoms* of these displacements have given rise to much discussion, some maintaining that they produce no symptoms at all. We are sometimes surprised on examining a patient to find a well-marked flexion which had not made its presence felt by any symptoms. This is however the exception; as a rule, displacements are followed by a well-marked train of symptoms from which a provisional diagnosis may be made. This apparent contradiction is to be explained by the fact that flexions and versions, in themselves, give rise to no symptoms primarily. The symptoms arise *secondarily*, and are due (1) to interference with the functions of menstruation, conception, and pregnancy; (2) to chronic metritis and endometritis which is produced by the displacement; (3) to pelvic cellulitis and peritonitis, which frequently accompany the displacement and are sometimes the cause of it.

As regards the *physical examination*, it is evident that the position and direction of the cervix is not a guide to the position of the fundus. If we had simply to do with versions, we might compare the uterus to a lever of which the body would be the long and the cervix the short arm; and the direction of the short would indicate the position of the long arm. But the possibility of flexion introduces a joint on the lever, so that the direction of the short is no guide to the direction of the long arm. We cannot from a simple vaginal examination of the cervix infer the position of the fundus, which is the point to be ascertained. A careful bimanual examination, supplemented if necessary by the use of the sound, is essential for a diagnosis.

As regards *treatment* the student should recognise how many lesions are present, and whether they are causes or results; a frequent chain is that a cellulitis produces a displacement which is followed by metritis, endometritis, and ovaritis. In most cases there is more than one pathological condition present, and these must be treated in order. We first *check existing inflammation* by hot water injections, blistering, rest, and the use of the glycerine plug. Ergot is given when menstruation is increased. When the absence of tenderness on examination has shown that inflammation is checked, we then—but not till then—think of treating the displacement. The time chosen should be between two menstrual periods. In backward displacement, we bring the uterus to its normal position and retain it there. In forward displacements, usually we dilate or straighten the uterine canal and in some rare cases support the uterus. The *after-treatment requires more attention than the immediate correction of the displacement*, and months of careful watching are necessary. Thus, the keeping of the uterus in its place by a carefully adapted pessary is more important than the replacement; the keeping of the uterine canal open after Sims' operation is more important than the operation itself.

ANTEFLEXION.

PATHOLOGY.

Anteflexion, as has before been stated, is merely an exaggeration of the normal condition. As to its frequency, there is great difference of opinion. The reason of this diversity is that a degree of flexion which would be called pathological by one observer would still be called physiological by another. The question of symptoms does not help us in deciding this; because, on the one hand, we sometimes find an amount of flexion which is decidedly pathological although the patient does not complain of any special symptoms; on the other hand, the characteristic symptoms may exist but be due to a different cause. *Anteflexion is more common in nulliparæ* just as retroflexion is more frequent in multiparæ, the reason being that anteflexion is a frequent cause of nulliparity.

The usual *seat of the flexion* is at the upper portion of the cervix, or at its junction with the body. Flexion of the body itself is rare. Sometimes the cervix is bent sharply forwards, so that it lies in the axis of the vagina and forms a distinct right angle with the body which is approximately in its normal position (see fig. 196). In other cases, the uterus is sharply curved on itself (see figs. 40 and 197). This last condition is sometimes mistaken for retroversion, because the finger feels through the posterior fornix the supra-vaginal portion curving backwards and the position of the fundus is not ascertained till the bimanual examination is made. In such cases the examination with one finger in the rectum is useful, as we can thus get above the point of flexion and feel that the fundus turns forwards.

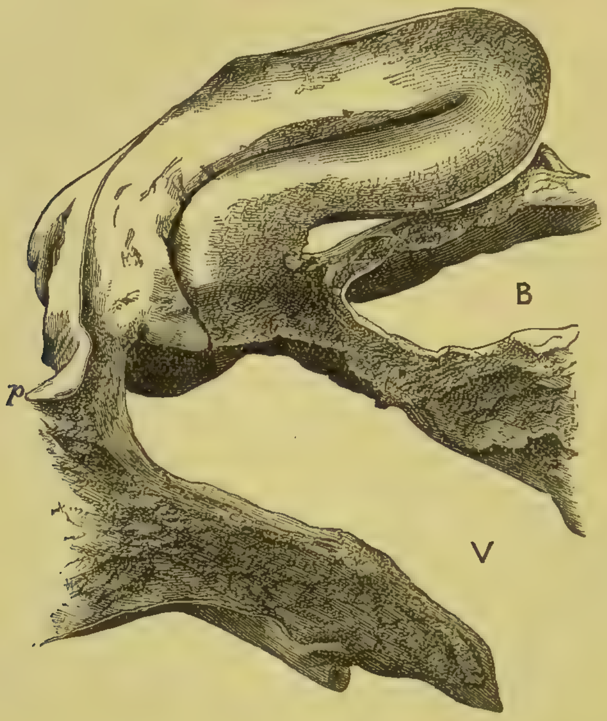


Fig. 196.

Anteflexion with stenosis at os externum. *V* vagina, *B* bladder, *p* peritoneum of pouch of Douglas (Winckel).

The vaginal portion is frequently small and the os reduced to a pin hole (congenital cases); sometimes it is high up and difficult to reach, being drawn upwards and backwards by cicatricial bands. As regards the microscopic changes in the tissue, we are still in want of information. Virchow found no fatty degeneration of muscular fibre at the angle of flexion; the tissue was anæmic at this point but congested elsewhere. According to Rokitansky, the connective tissue framework of the uterus is thinnest at the os internum; hence the liability to flexion at this point.

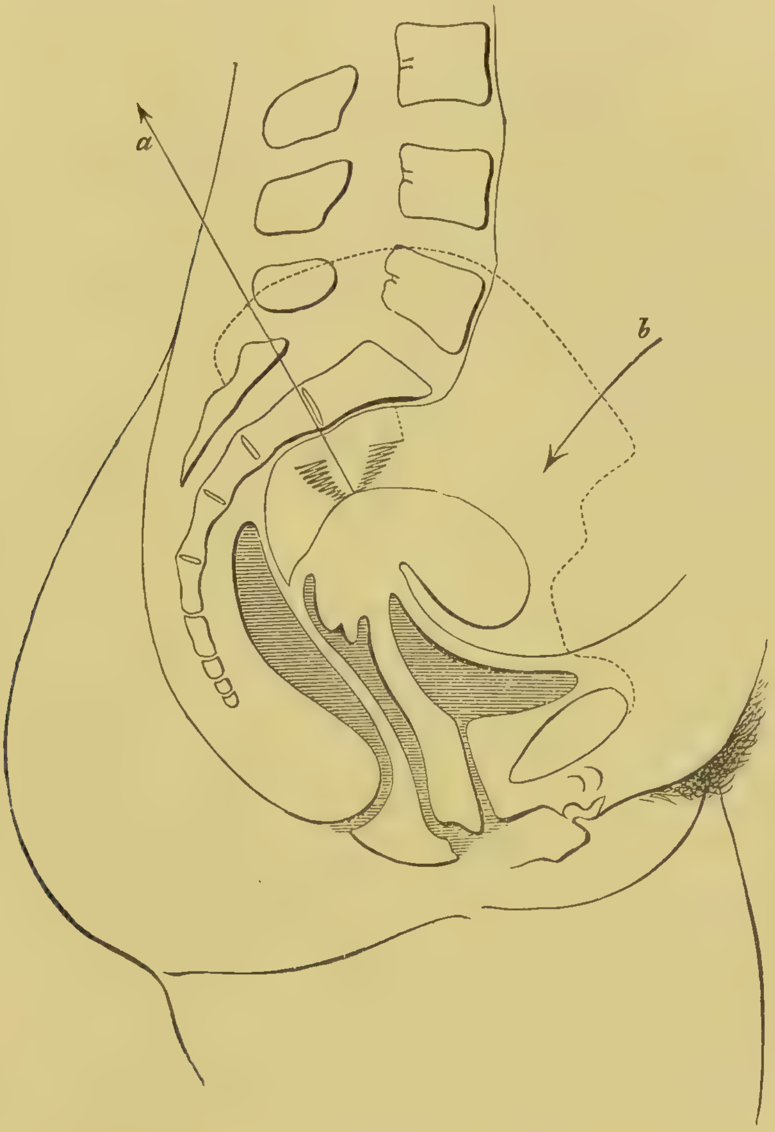


Fig. 197.

Diagram to show anteflexion produced by cicatrisation of utero-sacral ligaments (Schultze).

ETIOLOGY.

Etiologically we distinguish two kinds of anteflexion, the congenital and the acquired.

In cases in which the anteflexion is *congenital*, the whole uterus is imperfectly developed, the cervix is small and the pin-hole os looks downwards and forwards. Fritsch gives an ingenious explanation of how the flexion is produced in such cases. The uterus of the new-born child has thin walls and is flexible: the intra-abdominal pressure acts on the posterior surface of the fundus and produces anteflexion; this action is counteracted by the bladder on which the uterus is, as it were, moulded; when the uterus remains small and thin walled, it does not offer such a large surface to the bladder so as to be raised by it and have its flexion undone. Accordingly, a pathological degree of anteflexion is produced. The same writer would also refer some cases to congenital shortening of the utero-sacral ligaments.

As regards *acquired* anteflexion, it is undoubtedly often the result of inflammatory changes behind the uterus. In many cases of anteflexion, we observe that the cervix is higher than its normal position and far back in the pelvis; and that the attempt to bring it to its normal position produces pain. The cause of this condition was first brought into notice by Schultze,* who ascribes it to a cellulitis in the utero-sacral ligaments. This produces cicatricial contraction so that the cervix is drawn upwards and backwards, and the fundus thrown more forwards. Schrœder, however, holds that the retraction of the cervix is produced by adhesions resulting from peritonitis. We draw attention specially to this cause of anteflexion, because it can be distinctly made out by careful examination. When it has been made out it is a contra-indication to hasty operative interference, and the prognosis as to cure is unfavourable.

Graily Hewitt refers this, as all other flexions, to the condition of the uterine tissue.

It is evident that a fibroma, or other tumour increasing the weight of the fundus, will favour anteflexion if the fundus be directed forwards. In the commencing enlargement of pregnancy, the fundus droops more forwards or is at least more distinctly felt in the anterior fornix.

Unequal growth of the uterine walls has been given as the cause of congenital flexions, and unequal involution of the walls as the cause of flexions acquired during the puerperium. This is merely an explanation of how it is produced; the cause of this unequal growth requires, in turn, an explanation.

---

* Loc. cit., S. 414

SYMPTOMS.

The most important symptoms are—

Dysmenorrhœa,
Sterility.

In addition to these there are sometimes present—

Leucorrhœa,
Menorrhagia.

Frequently there are the ordinary symptoms of pelvic inflammation.

In some cases we find a well-marked anteflexion giving rise to no symptoms which patients complain of, as they are not accustomed to speak of sterility as a symptom; but dysmenorrhœa is generally present, and is the symptom which leads the patient to seek advice.

Dysmenorrhœa. By this we understand that menstruation is accompanied with pain. The form of dysmenorrhœa present in anteflexion is called "uterine," in contradistinction to "ovarian" (see Dysmenorrhœa, Section VIII). By "uterine dysmenorrhœa," we understand that the pain is not marked until the menstrual flow has appeared and that it continues as long as the discharge continues. The pain is felt in the small of the back and sometimes in the pelvis generally, but is not localised in one ovarian region. In typical cases, the pain resembles labour pains and the menstrual blood is clotted.

Two different explanations of this pain have been given, and these have an important bearing on treatment. For convenience, we describe these as the obstruction and the congestion theories.

1. The *obstruction* or *mechanical theory* is the one most generally accepted, and furnishes the rationale of the operative modes of treatment introduced by Sir J. Y. Simpson and Marion Sims. According to this explanation, the flexion of the uterus produces a narrowing of the uterine canal at the point of flexion. Hence, when the menstrual blood is poured out into the cavity of the uterus, it finds an obstacle to its free exit. There is consequent retention and coagulation, and the coagula stimulate the uterus to muscular contractions to effect their expulsion. The mechanical resistance to the outflow of blood and the uterine contractions excited to overcome this, are the cause of the pain. The condition is comparable to that in stricture of the male urethra. The blood, like the urine, is secreted but cannot be passed without pain; there is dilatation with sometimes secondary hypertrophy of the uterus in the former case, as of the bladder in the

latter. It may fairly be objected to this mechanical explanation that the discharge is not always clotted, that in some cases it is very small in quantity, that it is doubtful whether the small blood clots excite painful contractions, and that in many cases the pains complained of have not the distinctive character of labour pains. On the other hand, if this theory be not the true one, it is difficult to explain the great benefit derived from various modes of treatment based on it to be presently described.

2. The *congestion theory* is clearly stated and advocated by Fritsch.* According to this gynecologist, the dysmenorrhœa is not due directly to the bend on the canal. The pain arises from the resistance which the muscular tissue of the uterus offers to the hyperæmia. In normal cases, this tissue yields to the distending vessels; but, when the uterus is small or bent on itself, there is an obstruction offered to the flow of blood. The mucous membrane cannot swell up as it does normally. Thus there is undue vascular tension and compression of the nerve endings in the uterus. This last causes the pain.

Whether this explanation harmonises better with the facts it is difficult to say; but we should suggest a modification of Fritsch's views, which the student might combine with the purely mechanical theory. The flushing of any diseased tissue with blood causes an aggravation of pain, which is increased if the tissue be of a dense structure. The cause of the intense pain in periostitis as the affected limb becomes warm in bed, is thus explained. Now the tissues of the uterus are frequently in a state of chronic inflammation, and there is sometimes increase of connective tissue making it of a less yielding structure; this occurs in retroflexion complicated with subinvolution. The monthly flushing of the pelvis with blood would, under these circumstances, be accompanied with pain. We must also remember that cellulitis and peritonitis are often present with anteflexion; and increase of pelvic congestion will, of course, produce increase of pain.

Sterility is frequently associated with anteflexion; the patient is not so likely to refer to it, as the dysmenorrhœa is the more pressing symptom and that for which she seeks advice. This symptom has been referred to the obstruction in the uterine canal; as the menstrual blood is prevented from passing downwards, so the spermatozoa are prevented from passing upwards. But it is evident that this mechanical explanation is insufficient, because no mere contraction could prevent the passage of microscopic spermatozoa; without doubt sterility is frequently the result of the binding down of the ovaries or the Fallopian tubes by concomitant inflammation. However we explain it, the clinical fact remains that by passing the sound or dividing the cervix we place the patient under more favourable conditions for conception.

---

* Loc. cit., S. 35.

Dyspareunia—pain on sexual intercourse—is occasionally an important symptom, though naturally the patient does not refer to it. In such cases we generally find that there is inflammatory action behind the cervix.

Leucorrhœa is generally present, more especially if the uterus be enlarged. It is not so important a symptom as it is in retroflexion.

Menorrhagia is sometimes present, when there is uterine enlargement or endometritis as the result of anteflexion.

PHYSICAL DIAGNOSIS.

On making the vaginal examination the cervix is felt to be high up, and lies in the axis of the vagina with the os looking downwards and forwards. It may be small and conical, with a pin-hole os (congenital, *v.* fig. 147); or the anterior lip may be elongated, the end of the cervix being at the same time somewhat flattened against the posterior vaginal wall. The body of the uterus is felt in the anterior fornix continuous with the cervix, with which it forms a distinct angle in which the tip of the finger may be placed. If the flexion be high up or the uterus drawn upwards, the body may not be felt on simple vaginal examination. Even if it be felt, we cannot be certain that it is the body of the uterus till the Bimanual is made as follows. Endeavour to get the body felt in the anterior fornix fairly between the hands; by examining all round, make sure that what is grasped is the body of the uterus. Now place the index finger under the fundus in front of the angle and the middle finger against the cervix, and, making pressure with the external hand, ascertain to what extent the flexion yields. Examine carefully the posterior fornix to see if there are any bands drawing the cervix backwards; try whether bringing the cervix forcibly forwards causes pain, which would indicate an inflammatory condition in the utero-sacral ligaments or the presence of adhesions in the pouch of Douglas. We can ascertain this even better by passing the middle finger into the rectum, the index finger being in the vagina, and at the same time making the bimanual examination. The finger in the rectum feels a pouch in the anterior rectal wall bounded by a tense band on each side (utero-sacral ligaments), or one or more cord-like adhesions (the result of former peritonitis), or a general resistance to pressure which produces pain. Any of these conditions indicate that the cause has been inflammation, which has produced cicatrisation behind the cervix.

Though the bimanual examination is in many cases sufficient, it may be supplemented by the use of the sound. This is necessary for differential diagnosis, and its frequent introduction constitutes one form of treatment. Curve the sound to correspond to the angle of flexion. It will be found to pass with comparative ease for about an inch or an inch and a half, and then it is stopped by the angle of flexion. To get it past this, press up the fundus through the anterior fornix with the finger in the vagina or draw down the uterus with the volsella. The sound shows that the length of the uterine cavity is sometimes diminished (congenitally small uterus), sometimes increased (the result of the obstruction to the outflow of menstrual blood). It may further show tenderness in the uterine cavity (endometritis). The use of the sound is undesirable where there is inflammation behind the uterus and, when the bimanual places the diagnosis beyond doubt, is unnecessary except for treatment.

DIFFERENTIAL DIAGNOSIS.

The only conditions which, after careful examination, might yet be mistaken for an anteflexion are—

Myoma in the anterior uterine wall,
Cellulitis between the cervix and the bladder.

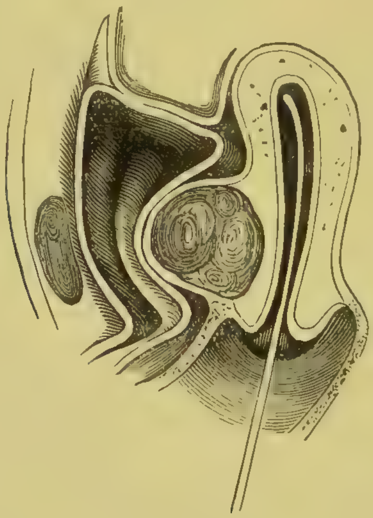


Fig. 198.

Sound passed to show that a myoma of the anterior wall is not an anteflexion; the bladder is to the left (Leblond).

A *myoma* is easily diagnosed by the sound. As in anteflexion, a body is felt in the anterior fornix; and we must ascertain whether this body is the fundus uteri. When the sound is passed into the uterus (fig. 198) in a case of myoma, a finger in the anterior fornix does not feel the sound or feels that a body lies between it and the instrument. Now make the bimanual examination with the sound in the uterus; the position of the fundus is indicated by the external hand feeling the point of the sound.

The diagnosis from cellulitis is less easy, because through the tenderness it is difficult to ascertain whether the body felt in the anterior fornix is the fundus uteri or a cellulitic deposit. A careful bimanual examination will, if it be a cellulitic deposit, show that the fundus uteri is lying in some other position. When active inflammation is present, the use of the sound is contra-indicated.

PROGNOSIS.

The prognosis should always be guarded in respect of the disappearance of symptoms. The most favourable cases as to a cure are those where the anteflexion is congenital, is situated low down, and where there is no pelvic inflammation.

TREATMENT.

Pelvic inflammation, if present, must first be treated. Where the uterus is displaced by cicatricial bands, the stretching of these by massage has been suggested and is certainly worthy of trial. With two fingers of the right hand in the posterior fornix behind the cervix and the external hand pressed deeply into the hollow of the sacrum so as to get behind the fundus uteri, we manipulate the uterus between the hands so as to bring it near the pubis and thus stretch the adhesions behind it. Massage is accompanied with free use of the vaginal douche. This process is repeated at weekly intervals, but is stopped if inflammation ensues.

A considerable number of cases are benefited by operative treatment; but we must select the cases on definite principles.

1. We should not operate if there be active inflammation present, as indicated by tenderness on pressure in the fornices. The presence of an old cellulitic deposit or thickening of the pelvic peritoneum is not a contra-indication.

2. We should not operate if the whole uterus is congenitally small. The introduction of a uterine stem in such cases may stimulate the uterus to increased growth; if dysmenorrhœa be present, the mere correcting of the flexion will not probably cure it; the sterility is

probably due to some other effect of the arrested development. Such cases should be left alone. Nor should we operate when the menstrual flow is gradually diminishing in quantity.

To understand the *methods* of *operative treatment*, let us compare them with those of stricture of the male urethra. Here we have three modes of treatment: we may dilate the stricture by passing instruments of gradually increasing size; we may pass an instrument and leave it, thus producing vital dilatation; if both of these means fail, we may divide the stricture with the knife. For the treatment of anteflexion, we have three analogous methods: we pass the uterine sound occasionally, or pass uterine dilators of gradually increasing calibre; we introduce an intra-uterine stem, and leave it in; we divide the constricting portion of the canal at the os externum, and the knee-shaped bend at the point of flexion.

1. The occasional *introduction of the sound*, say twice-a-week between the menstrual periods, is sometimes followed by distinct relief of the symptoms. It has the advantage of being easily done, is seldom followed by injurious effects if done with ordinary care, and should always be tried in the first instance. Dr Macintosh employed sounds (made of steel) of gradually increasing calibre to dilate the canal more effectually.

2. Where the flexion is not acute or resistant, the *intra-uterine stem* is useful. It serves both to straighten the canal and also to keep it open. The copper intra-uterine stem (see fig. 199) introduced by Sir J. Y. Simpson, or one of similar form made of vulcanite which has the advantage of being lighter, or the hollow gutta-percha one (see fig. 200) recommended by Greenhalgh (which acts like a drainage tube), may be used for this purpose. In employing the rigid intra-uterine stem, we must see that the stem is a quarter of an inch shorter than the uterine canal so that it may not press injuriously upon the fundus. Greenhalgh's stem is carried in on the ordinary uterine sound. For the method of introducing the rigid stem see page 248. The stem can be worn for months; it need not be removed during the

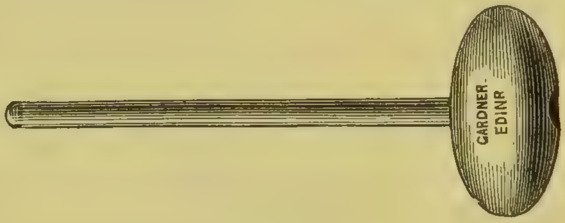


Fig. 199.

Solid intra-uterine made of copper.

menstrual period, but should be taken out when there is suspicion of pregnancy. Conception sometimes takes place with the stem *in situ.* Even the judicious use of stem pessaries is apt to be followed by mischief; they require, therefore, careful watching.

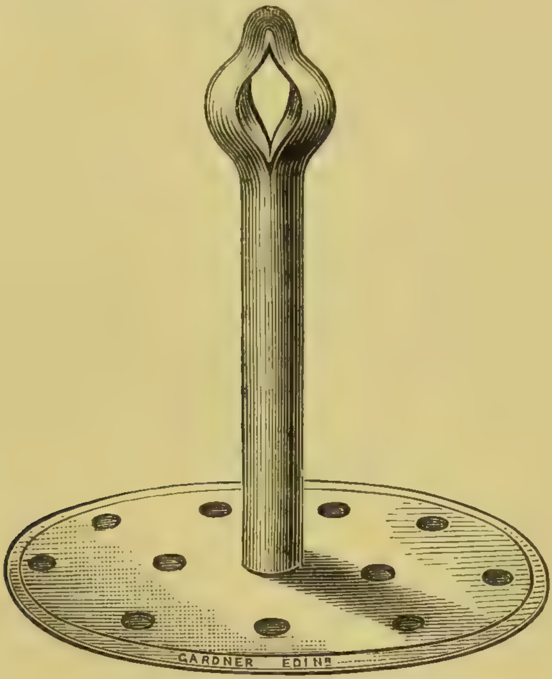


Fig. 200.
Greenhalgh's intra-uterine stem.

3. If both of these means of treatment fail, we have recourse to division of the cervix. In some cases, it is evident from the first that this is the proper mode of treatment; it is often followed by brilliant results. There are two distinct modes of procedure, each adapted to a particular class of cases. There is (1) the bilateral division of the cervix introduced by Sir J. Y. Simpson; and (2) the antero-posterior section of the posterior lip with division of the mucous membrane of the anterior wall of the cervix at the seat of flexion, introduced by Marion Sims.*

(1.) When there is a small pin-hole os and the flexion not pronounced (the symptoms being due to the narrow os externum), or when sterility rather than dysmenorrhœa is the leading symptom, the indication is for Simpson's operation. This has been already fully described under stenosis of the cervix (Chap. XXIV).

(2.) Marion Sims recommends that his operation be performed in cases where there is well-marked flexion, and the intra-vaginal portion unequally developed, *i.e.*, where the posterior lip is elongated so that the os looks downwards and forwards. The intention of the operation is to correct the flexion of the canal by making the exit at the base of the posterior lip of the cervix instead of at its apex, that is, at the outer end of the dotted line *a* (fig. 201). But as the flexion is too high up to be reached by this incision alone, it is necessary for the more complete straightening of the canal that the tissue of the knee-shaped bend in the anterior wall be partially divided—the incision to be made to the depth of the line *b* (fig. 201).

---

* For fuller details, see his paper :—On the Surgical Treatment of Stenosis of the Cervix Uteri : Am. Gyn. Trans., 1878.

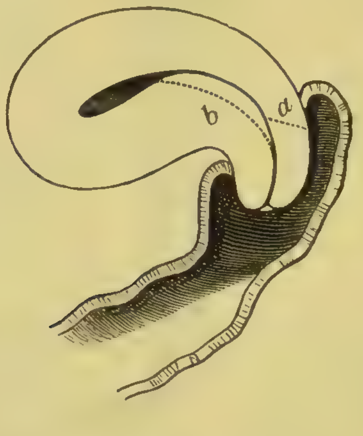


Fig. 201.
Sims' division of cervix; *a* incision in posterior lip, *b* incision at knee of flexion (Marion Sims).

This operation should not be performed indiscriminately in all cases of uterine dysmenorrhœa, but only after we have ascertained by careful examination that the flexion is sufficient to account for the dysmenorrhœa and that the latter is due to nothing else. The patient should be informed that sometimes the symptoms return afterwards; this is due to the partial closing up of the incision, which may occur in spite of the greatest precautions. When pelvic inflammation is present, we should not operate. If the cervix is drawn backwards and fixed, we are not likely to have a good result.

The operation is performed as follows. The speculum having been passed, the cervix is drawn down with the volsella to the vaginal orifice. Marion Sims divides the posterior lip with his utero-tome. A pair of strong scissors does equally well. Kuchenmeister's scissors have the point of one blade turned in like a hook; this blade is placed externally in making the section, and the pointed hook keeps the scissors from slipping. The scissors in fig. 111 have this peculiarity; and the form of the handles, with their greater length in proportion to that of the blades, gives the hand better purchase and enables the operator to cut steadily through the dense tissue of the cervix. The instrument is passed, with the straight blade in the cervical canal, till the incurved point of the external blade is opposite the line of reflexion of the mucous membrane on the posterior wall of the vaginal portion. The handles are now approximated, the ratchets on them enabling us to do this slowly and steadily. When they are brought together, the instrument is withdrawn. The finger is passed into the cut to see if it is of sufficient depth; if any projecting band of tissue be felt, it is divided with the knife. The mucous membrane of the anterior wall of the cervix at the seat of flexure is now divided as follows:—A curved tenotomy-knife, with a narrow probe-pointed blade, is passed into the canal; the sharp edge is turned forwards, but the back of the knife is pressed against the posterior wall so that the knife does not cut on being passed in; having passed it fairly to the point of flexion, we now withdraw it and at the same time press the blade forwards. We judge as to the extent of this incision from the amount of flexion present (ascertained by previous examination) and from the sensation of the hand in cutting through the tissue.

After-treatment. The incision must be kept open by the introduction of a glass plug (fig. 157). Unless this be done, the result is only temporary; we speak from experience, having operated in several cases without the introduction of a plug subsequently. The patient in these cases derived great benefit for two or three menstrual periods, but after this the symptoms returned; and it was found, on examination, that the new opening had been obliterated by cicatrisation.

The treatment of anteflexion by specially adapted vaginal pessaries is recommended by Thomas and others, but is not a scientific one. It is wrong in principle, because the fundus uteri cannot be propped up by an arm of the pessary projecting through the anterior fornix so as to diminish the angle of flexion. In some cases where the uterus is large and heavy we find that benefit is derived from supporting the uterus as a whole. But this is best effected by an ordinary vaginal pessary (Hodge or Albert Smith), and is not a mode of treatment specially of anteflexion. We shall refer to this again under the treatment of anteversion.

ANTEVERSION.

PATHOLOGY AND ETIOLOGY.

The *pathological change* consists in a straightening of the uterine axis, so that the normal angle of forward curvature is diminished and the cervix passes more directly backwards. The uterus is usually enlarged and its texture is firmer. In this condition it is moveable or fixed. If the former, its position varies with the distention of the bladder ; if the latter, the fixed uterus will press more or less on the bladder as it distends and thus produce one of the symptoms of anteversion.

According to Fritsch, the fixation of the uterus is never to the pubis ; this is because the bladder, lying between the fundus and the symphysis, prevents adhesions from forming. On post-mortem examination of a case in which he had diagnosed anteversion with fixation, he found that the fundus was bound down at its left angle.

The microscopic changes have not been described, but we should expect an increase in the amount of connective tissue (*v.* Chronic Metritis).

ETIOLOGY.

As anteversion is *the form and position taken up by the uterus when it is enlarged through chronic metritis*, the *causes* which produce anteversion are those which produce chronic metritis—subinvolution, laceration of the cervix, and other causes of pelvic inflammation (*v.* Chronic Metritis).

This position also occurs physiologically in early pregnancy ; probably because the increased weight of the uterus causes it to fall more forwards.

SYMPTOMS.

There are no symptoms characteristic of anteversion, *per se*, but we generally find present, in the first place, the local symptoms of chronic uterine and pelvic inflammation.

Thomas draws attention specially to loss of power in walking—when the version was treated, power was restored ; this was probably a reflex phenomenon. Sometimes there are symptoms due to interference with the functions of the bladder and the rectum. Pressure of the fundus (when the uterus is *fixed*) on the bladder produces frequent calls to micturition ; pressure of the cervix on the posterior wall of the vagina produces erosion and catarrh, and on the anterior wall of the rectum produces painful defæcation.

Further we may have the train of general symptoms which follow on any long-standing disturbance of the reproductive system, viz., derangements of the digestive and nervous systems. Schrœder draws attention to the fact that discomfort is often produced when the uterus is enlarged but freely moveable, and that this is due to the heavy organ's becoming displaced on the movements of the patient; further, that it is relieved if the uterus be fixed by a vaginal ring pessary.

DIAGNOSIS.

There is usually no difficulty in diagnosis. The finger in the vagina feels the cervix passing directly backwards, the os looking towards the hollow of the sacrum. The body of the uterus is distinctly felt through the anterior fornix; and on tracing it back to its junction with the cervix, we do not feel the normal forward curvature. The whole organ is usually enlarged and firm in texture. From the distinctness with which the uterus is felt when the bladder is empty, we might infer that only the anterior vaginal wall lay between it and the finger. But, if we make the examination when the bladder is partially distended or if we pass the sound into the empty bladder, we find that the bladder passes backwards almost as far as the cervix uteri. Perhaps the bladder symptoms, which are present in marked cases, might be explained through the traction thus made on the bladder and its abnormal position; these interfere with its dilatation.

The bimanual examination shows that the body felt in the anterior fornix is the fundus uteri. The student should not however be content with this knowledge, but should examine carefully the size and mobility of the uterus; and, when it is fixed, should ascertain the cause of this.

The introduction of the sound is difficult on account of the high position of the os, and its use is unnecessary except in cases of doubt as to whether the body felt anteriorly is the fundus uteri.

The only case in which there is difficulty in differential diagnosis is when there has been inflammatory deposit in front of and around the cervix, simulating the anteverted fundus. In these cases the combined examination is difficult from existing inflammation. The examination with one finger in the rectum enables us, in such cases, to ascertain that the fundus uteri is at least not lying to the back.

TREATMENT.

From what we have said in regard to the symptoms, it follows that the treatment, in the first instance, is that of endometritis, metritis, cellulitis, or peritonitis, according to the condition which is present. As regards the supporting of the uterus, great benefit may be derived from the glycerine plug, which in this case should be well packed into the posterior fornix. The simple vaginal pessary (Hodge, Albert

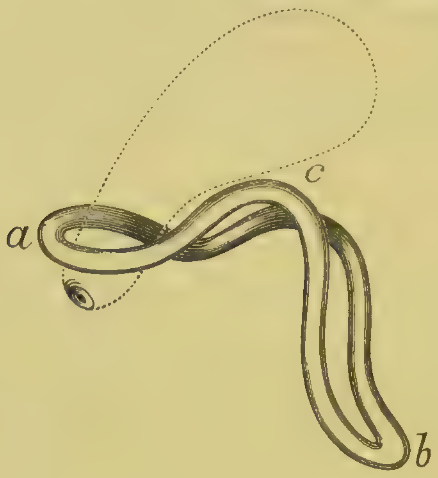


Fig. 202.

Graily Hewitt's Cradle Pessary. *a* is in posterior fornix; *b* at vaginal orifice; *c* in anterior fornix (Barnes).

Smith, ring) is useful in supporting the uterus as a whole, and in fixing the cervix.

As already said under anteflexion, the fundus cannot be immediately supported through the anterior vaginal wall. Various forms of pessary

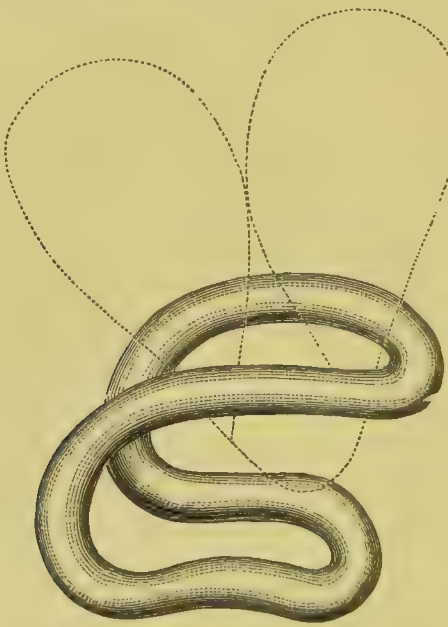


Fig. 203.

Gehrung's Anteversion Pessary *in situ* (Gehrung).

have been devised, but the principle is the same in all. There is the "cradle pessary" of Graily Hewitt (fig. 202), made of vulcanite.

Mundé strongly recommends Gehrung's anteversion pessary (fig. 203). Its position in the vagina is seen at fig. 204. Thomas has devised several forms of anteversion pessary, of which one is represented at fig. 205. It is simply a Hodge pessary, with a projecting bar which passes into the anterior fornix and tilts the cervix forwards and thus slightly retroverts the fundus. To facilitate its introduction the bar moves on a hinge so that it may be brought parallel with the pessary as it is passed in, while a concealed india-rubber spring brings it into place when it is within the vagina. The patient requires careful watching after its introduction, as it is liable to set up pelvic inflammation. Several cases are recorded by Thomas of benefit derived from wearing such a pessary.

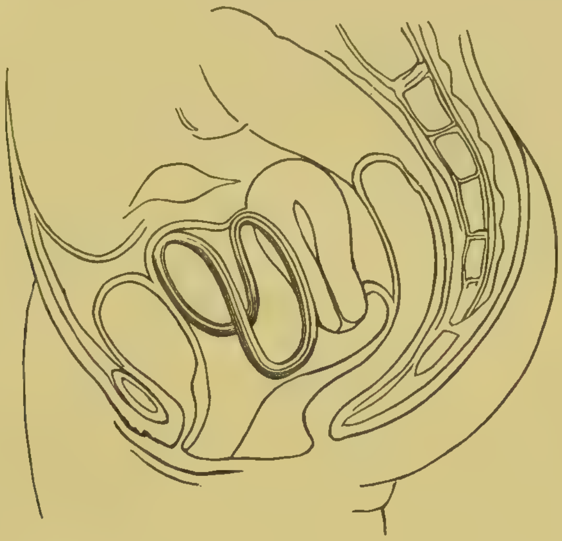


Fig. 204.

Gehrung's Anteversion Pessary as placed by Mundé. The Pessary is figured relatively too large (Mundé).

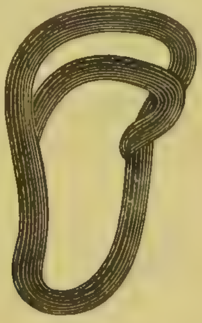


Fig. 205.

Thomas' Anteversion Pessary.

We have described anteversion as one of the displacements of the uterus. The student should note, however, that anteversion is in itself not a lesion but one of the "physical signs" of metritis, chronic pelvic peritonitis or pregnancy. It is improbable that the mere anteversion of the uterus causes any distress. The ordinary statement that the uterus when anteverted presses on the bladder, is open to the fatal criticism that the uterus always presses on the bladder; while, so far as mere weight is concerned, there are, in the majority of cases, no special symptoms referable to the anteversion of early pregnancy. Any enthusiastic believer in anteversion pessaries is bound to insert them in all cases of early pregnancy. Probably, in a few years, anteversion will cease to be considered among uterine displacements.

RETROVERSION.

PATHOLOGY AND ETIOLOGY.

Physiological retroversion occurs whenever the bladder is fully distended (*v.* fig. 44). This is distinguished from the pathological condition by the fact that it is transient, and ceases when the bladder is emptied.

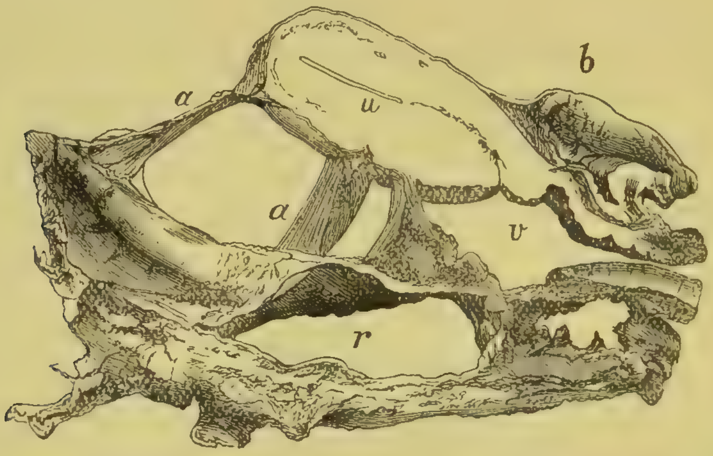


Fig. 206.

Uterus retroverted and bound back by peritonic adhesions (Winckel). *a a* adhesions; *b* bladder; *v* vagina; *u* uterus; *r* rectum (½).

Pathological retroversion is found under the following conditions:—

1. During the first days of the puerperium the uterus lies retroverted, or at least retroposed. The weight of the uterus and the laxity of its attachments makes it occupy this position when the patient is recumbent.

2. It is produced by the mechanism of prolapsus uteri (*v.* Section VII). The axis of the uterus changes its direction as the organ descends.

3. It is also of importance as a stage in the production of retroflexion, which is the most frequent and important displacement which calls for treatment. The uterus becomes retroverted, and then acquires a backward flexion.

4. Chronic peritonitis producing obliteration of the pouch of Douglas, or cicatricial bands which drag the uterus backwards, will produce a permanent retroversion—as is beautifully shown in the accompanying preparation from Winckel's Atlas (fig. 206).

The chief *causes* of retroversion are :—

1. A sudden straining effort, or a violent blow ;
2. Non-return of the uterus to its normal form and position during the puerperium ;
3. Inflammatory action behind the uterus, producing adhesions or cicatricial bands.

SYMPTOMS.

The symptoms of retroversion are the same as those found in retroflexion, to be presently described. When it arises during the puerperium, a late flooding—two to three weeks after labour—is sometimes a prominent symptom ; or there is a daily loss of blood in small quantities whenever the patient rises and goes about (Fritsch).

DIAGNOSIS.

On vaginal examination, the cervix is low down in the pelvis and the os looks downwards and forwards. The finger feels the supra-vaginal portion of the cervix through the posterior fornix and may be able to reach the fundus, but the posterior surface is straight—there is no angle of flexion.

On bimanual examination, the hands can meet in the anterior fornix with nothing but the vaginal and abdominal walls between them. It is difficult to make out the body of the uterus ; we may try to do this in two ways. *First*, with one finger in front of the cervix and the other behind it, lift the uterus upwards towards the abdominal walls ; the hand placed on the abdomen will feel the anterior surface of the body of the uterus moving under it. *Second*, tilt the cervix well forwards with the index finger in the vagina, and thus increase the retroversion ; the middle finger will feel the body of the uterus through the posterior fornix.

The rectal examination is of great service here. The sound will pass as in fig. 93.

The differential diagnosis is the same as in retroflexion. The only point requiring special notice here is that we may have a retroversion with an anteflexion high up. Cases of anteflexion due to cicatrisation of the utero-sacral ligaments are often, from the backward direction of the cervix, diagnosed as a retroversion (*v. p.* 316).

TREATMENT.

This consists in (1) removing existing inflammation; (2) replacement of the uterus, when not fixed by adhesions; (3) retention of it in its normal position by pessaries. These will all be considered under retroflexion.

When adhesions are present, massage may be tried with a view to stretching these; or we may be content by supporting the retroverted uterus with a pessary.

RETROFLEXION.

For convenience this condition is usually called "Retroflexion," to distinguish it from "Retroversion" already described; strictly speaking the condition is RETROVERSION + RETROFLEXION.

PATHOLOGY.

The pathological changes in the position and structure of the organs in the pelvis consequent on retroversion+retroflexion, can only be learned from sections made with the organs *in situ*. An exact knowledge of these changes is very desirable, as this displacement, with its accompanying complex train of symptoms, is one of the most important which comes under the notice of the gynecologist.

We are indebted for the following facts chiefly to Fritsch, although he seems to base them more on clinical examination than on pathological study. The changes in the various structures will be considered separately and shortly.

The *cervix* is directed downwards and forwards, or directly downwards (*v.* fig. 209). We observe clinically that it is much more easily reached. This is due partly to the alteration in its direction and position (being nearer the symphysis pubis it is more within reach), partly to the sinking down of the uterus as a whole in the pelvis. The os is patulous, because retroflexion usually implies previous parturition. If deeply fissured, it may form a gaping cleft which readily admits the tip of the finger. There is often ectropium and cervical catarrh. Sometimes there is marked hypertrophy of the posterior lip, so that it is mistaken for the projection of the whole vaginal portion.

The *uterus* is flexed on itself, so that the fundus lies in the pouch of

Douglas, the depth to which the fundus descends and the acuteness of the angle of flexion varying in different cases (*v.* fig. 209). If the condition of the uterine walls offers no resistance to flexion, the intra-abdominal pressure will tend to drive the fundus downwards till equilibrium is maintained—that is, till the fundus rests in the bottom of the pouch of Douglas. In retroflexion, there is no counteracting force operating from below similar to that of the distending bladder in anteflexion.

The size of the uterus is increased, and its cavity measures more than two and a half inches. Since the flexion generally occurs while the uterus is still enlarged through subinvolution, it is difficult to say whether this hypertrophy arises as the direct result of the displacement or through its interfering with the process of involution. Whatever the cause of this hypertrophy is, its effect is to interfere with the natural cure of the displacement. The thickness of the uterine walls at the angle of flexion varies in different cases. Sometimes neither wall is atrophied at the point of flexion (fig. 207). Barnes says that according to his clinical experience this is the usual condition. On the other hand, Fritsch states that he has found marked thinning of the *posterior* wall at the angle of flexion. It is interesting to note that in a case of *congenital retroflexion* (see fig. 208) described by Ruge it is the *anterior wall* which is atrophied at the angle. The mucous membrane of the uterus is generally in a condition of chronic catarrh.

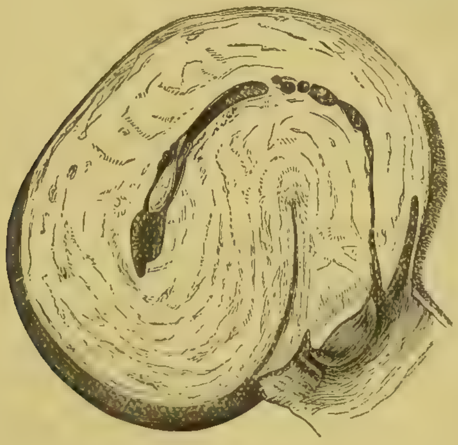


Fig. 207.

Extreme retroflexion of uterus (Barnes).

The microscopic changes consist in a dilated condition of the bloodvessels, with increase of connective tissue—the appearances produced by long continued passive congestion. At the point of flexion, however, an opposite condition has been described; the bloodvessels were compressed and the tissues atrophied.

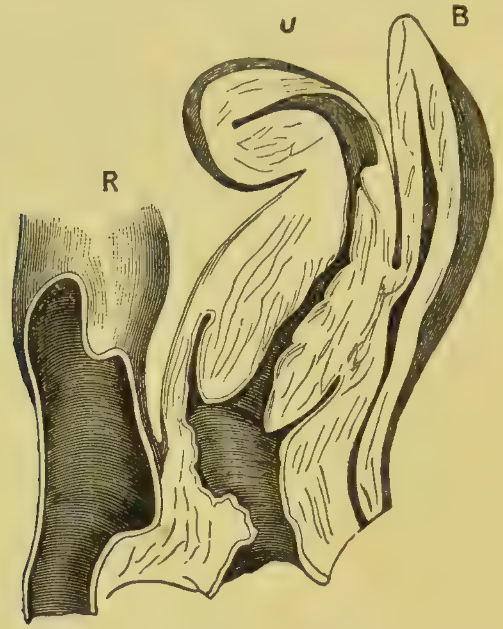


Fig. 208.
Congenital Retroflexion (Ruge). Note the thinning of the anterior wall of the uterus.

The *ovaries* follow as a rule the displaced fundus, the thin infundibulopelvic ligament stretching more readily than the ovarian. The position of the ovaries will, however, depend on the effects of peritonitic adhesions, which may fix them in any position. Sometimes we feel them below the fundus in the pouch of Douglas. They are frequently enlarged and tender on pressure.

The *bladder* is not necessarily altered in position, but has no longer the uterus resting upon it. The utero-vesical pouch is obliterated in cases of well-marked retroflexion. The ureters are often compressed or bent, which leads to dilatation; frequently they are found dilated to the thickness of the finger. Fritsch observed in one case the left ureter obliterated by a mass of cicatricial tissue, and the corresponding kidney changed into a sac full of white atheromatous debris.

The *rectum* has the retroflexed fundus pressing against its anterior wall and diminishing its cavity.

The *peritoneum* is altered in its normal relations as follows. The broad ligaments have their surfaces reversed, that is to say, the anterior, which was formerly inferior, is now superior; from their attachments, they offer no obstacle to retroflexion. The utero-vesical pouch is necessarily obliterated. The pouch of Douglas must, on the other hand, be distended by the fundus uteri; this implies a *stretching of the utero-sacral ligaments* associated with the alteration in position of the cervix.

The *pelvic nerves* are occasionally affected, as shown by weakness in the lower limbs. This loss of power must be produced reflexly; from the anatomical relations, the retroflexed fundus cannot compress the motor nerves of the sacral plexus as is sometimes affirmed.

ETIOLOGY.

Retroflexion of the uterus is the commonest pathological condition, next to pelvic inflammation, which we are called on to treat. It is rarely present as a congenital condition, in which respect it contrasts with anteflexion. It is frequent in multiparæ (rare in nulliparæ) because the etiology is specially related to the *puerperal condition.* In this condition the uterus is enlarged and heavy, and its walls are soft. The ligaments are lax, and the tissues of the pelvic floor have been recently stretched and have not recovered their tone. Through the distension of the bladder, the uterus is often thrown into a retroverted position.

We sometimes find on examining a patient shortly after her confinement that the uterus is lying back in the pelvis even though the bladder be not distended; we may thus suppose that the *intra-abdominal pressure* (which, when the uterus is in its normal position, is directed upon its posterior surface) comes now to act on the anterior surface, and drives the fundus backwards and downwards. If the uterine tissue is soft enough to allow the fundus to be flexed on the cervix, such a flexion will gradually take place when the patient makes straining efforts. Apart from this, the *dorsal posture* and the common practice of *tight bandaging* after confinement will favour backward displacement of the fundus. If the patient *rise too soon*, while the uterus is still large and heavy and the uterine supports correspondingly lax and weak, the tendency to displacement is increased.

The cause of retroflexion in nulliparæ is obscure.

SYMPTOMS.

The following are the more important local symptoms :—

Weakness in the back,
Symptoms of chronic pelvic peritonitis,
Painful defæcation;

Leucorrhœa,
Dysmenorrhœa,
Menorrhagia;

Sterility,
Abortion.

In long-standing cases, there may follow the train of general constitutional symptoms consequent on chronic uterine disease.

The symptoms are arranged in three groups:—the first, including those which are more or less continuous; the second, those which are within the menstrual period, variable or periodic; the third, those connected with the function of reproduction.

Weakness in the back is the most common complaint. It may amount to actual pain, which is aggravated on muscular exertion and generally at the menstrual periods. The symptoms of *chronic pelvic peritonitis* are usually present; the feeling of weight and discomfort in the pelvis is sometimes due to the stretching of old adhesions. The importance of pelvic inflammation, fixing the uterus in its abnormal position and preventing its replacement, we shall consider under treatment. *Painful defæcation* with tenesmus is explained by the relation of the loaded rectum to the retroflexed uterus; irritation from pressure of the fundus against the wall of the rectum produces straining efforts even though there be no fœcal matter in the rectum.

The *leucorrhœa* is due to chronic inflammation of the mucous membrane. As the result of the displacement, there is passive congestion of all the tissues of the uterus; this leads in the first instance to a simple hypersecretion of mucus, which gradually passes into chronic inflammation. The mucous secretion is more marked immediately after the increased congestion of the menstrual period; but, gradually, it spreads itself over the intermenstrual period. *Dysmenorrhœa* is not so frequent a symptom here as in anteflexion; the explanation is, on the mechanical theory, that retroflexion usually occurs in multiparæ where the cervical canal is patulous. *Menorrhagia* forms one of the more prominent symptoms; it is due partly to the chronic inflammation of the mucous membrane, partly to obstruction to the return of the blood from the uterus.

The *reproductive function* is variously and seriously affected. This is brought prominently under our notice, because retroflexion usually occurs in one who has already been pregnant, and presents an obstacle to further conception. Frequently, the patient tells us that she had a child several years ago; that she has suffered from pain in the back, leucorrhœa, and irregular menstruation since that time and has never conceived again. With this history, we commonly find retroflexion of the uterus. The *sterility* may, of course, be due to a variety of causes—the altered position of the cervix, the increased mucous secretion, obstruction of the Fallopian tubes, malposition of the ovaries. We cannot therefore be sure of curing the sterility by replacing the uterus, although we frequently find that the patient *does* conceive shortly after this treatment. After conception has taken place, there is the further risk of *abortion;* with a history of repeated abortion, we often find retroflexion. Conception may take place in a retroflexed uterus, which may afterwards right itself so that pregnancy goes on to the full time. Abortion is due to the inability of the uterus thus to right itself, or to the pathological condition of the mucous membrane which prevents the ovum from becoming securely attached. When abortion does not occur and the pregnant uterus does not straighten itself so as to grow upwards into the abdomen, it enlarges without the undoing of the flexion; in this case it will expand more and more into the hollow of the sacrum and become wedged below the promontory. This constitutes Retroflexion of the Gravid Uterus (*v.* Disturbances of the Reproductive Function, Section IX).

DIAGNOSIS.

On *vaginal* examination the cervix is felt low down in the pelvis, the cause of which has been explained under Pathology. The os looks directly downwards towards the perineum. A firm round body is felt in the posterior fornix, continuous with the cervix uteri but separated from it by a groove more or less distinctly marked according to the amount of flexion. Place the forefinger on the cervix, and the middle finger on this body; on moving the former, the latter moves with it.

But a fibroid tumour of the posterior wall would produce similar conditions; therefore, make the *bimanual* examination. First place the vaginal fingers in the anterior fornix and make pressure with the external hand until the fingers of both hands meet; there is nothing between them except the abdominal and vaginal walls, the fundus is therefore not to the front. Now put the vaginal fingers into the groove behind the cervix, or, better still, lay hold of the cervix with the index finger in front of it and the middle finger in the groove behind (see fig. 209), and lift up the uterus as high in the pelvis as possible; make pressure with the external hand until the cervix lies fairly between the hands; the upper surface of the uterus is felt to curve backwards. In a favourable case (with lax abdominal walls) we can do the bimanual examination on a still deeper plane, and get both hands to meet behind or at least fairly embrace the retroflexed fundus. Having ascertained that the fundus uteri is retroflexed, we ask ourselves whether it be fixed or movable—*whether it can be replaced or not.* In making our diagnosis we at the same time take a step towards treatment. To ascertain the mobility of the fundus, make steady pressure on it upwards; observe whether it gives way before the finger, and whether, on its yielding, the flexion becomes undone or the uterus simply rotates as a whole; note also whether this manipulation causes pain.

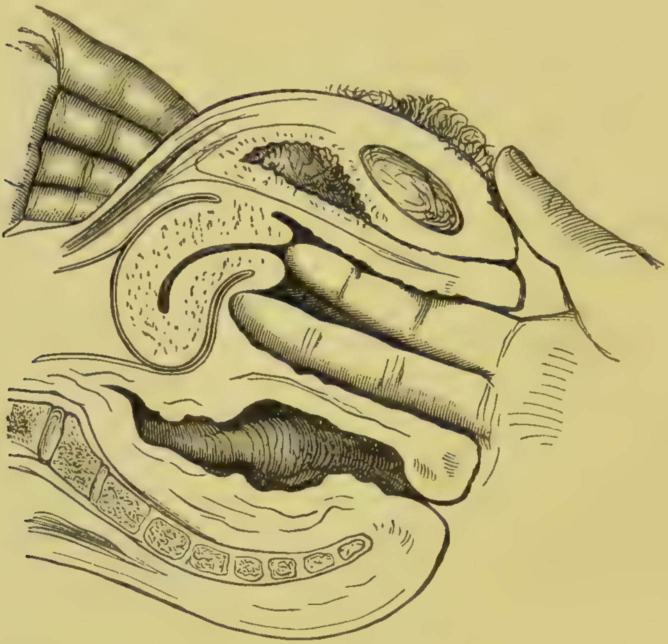


Fig. 209.

Diagnosis of retroflexion by bimanual examination.

The *rectal* examination has this advantage, that the finger passes upwards over the free surface of the fundus without displacing it. It is indispensable in cases where the rigidity of the abdominal walls prevents our getting the uterus between the hands in the bimanual. The drawing down of the uterus with the volsella is an additional help in such cases, as it enables the finger in the rectum to reach the fundus.

The *sound* confirms the diagnosis in doubtful cases, and tells us further whether the retroflexed uterus is enlarged. Before using the sound, we must palpate the uterus carefully to ascertain that it is not becoming enlarged with a growing ovum and inquire as to the patient's menstruation. We curve the sound to correspond with the degree of flexion ascertained on bimanual examination. If introduced with the concavity directed backwards, it passes into the uterine cavity without our having to make the rotation (*v.* fig. 93); through the posterior fornix, we feel the end of it in the retroflexed fundus; it usually passes in beyond the two and a half inches. We can also learn from the sound whether the uterus can be replaced or not; but it is better to get the information from the bimanual examination. The sound is of most use in differential diagnosis.

Differential diagnosis. The following are the conditions arranged in the order of frequency, which might be mistaken for retroflexion:—

Fæces in the rectum;
Pelvic deposit in the pouch of Douglas { Peritonitis, Hæmatocele, Carcinoma;
Cellulitis behind the the cervix;
Myoma of the posterior wall;
Prolapsed ovary or small ovarian tumour.

Fœcal matter in the rectum gives rise to difficulty only on superficial examination. We should always decline to give an opinion as to the condition of the pelvic organs when the rectum is loaded. If this be attended to, no mistake in diagnosis will be made under this head.

Pelvic deposit in the pouch of Douglas gives rise to more difficulty, because it may closely simulate the condition found in retroflexion—"a body felt through the posterior fornix and moving along with the cervix." Such a deposit will be proved not to be the fundus uteri by our finding the latter in another position. If inflammation is present, it is difficult to make the examination necessary to ascertain this; we may not be justified in using the sound just where it would give us the desired information: such cases present great difficulty in diagnosis, and the true condition can only be ascertained on repeated examination or after the inflammation has subsided.

Cellulitis behind the cervix is rarely present in such a form as to give rise to a mistake in diagnosis, unless the inflammation renders the necessary examination difficult.

A *myoma* projecting posteriorly from the lower segment of the uterus resembles, in form and firmness, the retroflexed fundus. On bimanual examination, however, we find that we have between the hands a larger body than the uterus alone. The fundus may also be felt to the front, and distinct from the tumour. To ascertain its position, it is best to make the bimanual examination with the sound in the cavity of the uterus. Fig. 198 shows the information given by the sound, if we suppose that the structure to the left of the figure is the rectum. A fibroid tumour accompanied by inflammation presents great difficulty.

If the *ovary* be *prolapsed*, enlarged through inflammation, and adherent to the posterior aspect of the uterus, it simulates (on vaginal examination) the retroflexed fundus. So also does a small *ovarian tumour* lying in the pouch of Douglas, though it is softer and more elastic than the uterus. The bimanual examination, supplemented if necessary by the use of the sound and the drawing down of the uterus with the volsella, enables us to ascertain the exact position of the fundus and its relation to the tumour.

PROGNOSIS.

The prognosis depends upon the mobility of the uterus, and the possibility of replacing it. It is always less favourable where inflammation is present; though we have seen considerable exudations become after a time absorbed, and the uterus again movable so that it could be replaced. As regards the probability of future conception, our statements should be guarded; though the probabilities are greatly increased if we can replace the uterus.

Whether a permanent cure of the displacement (so that the uterus will keep its normal position after the instrument is removed) is often effected, we have not much definite information. *A priori*, we should not expect that the stretched utero-sacral ligaments would readily become shortened again unless a pregnancy supervene. The curability of the retroflexion depends, according to Mundé, on the *recentness of the displacement;* "recent displacements of any variety are the only cases which offer a fair chance of complete recovery by any of the mechanical means at our disposal." The length of time during which a pessary must be worn so as to effect a cure of recent puerperal retroflexion is, according to Mundé, six months to a year.

TREATMENT.

This consist of two parts :—

1. Replacement of the retroflexed uterus;
2. Retention of it in its normal position by suitable means.

The first question which suggests itself on discovering a retroflexion is, whether we can replace the uterus; this has been ascertained at the same time as we made the diagnosis.

The two obstacles to treatment are the presence of existing inflammation and the fixation of the uterus in its abnormal position. The former must be treated by blistering, hot water injections, and the use of the glycerine plug; these may have to be continued for a month or more, and then we may attempt the reposition. This last may be impossible through the firmness of the flexure or the presence of old adhesions. It must be left to the operator to determine how much force he is justified in employing. Sometimes it is necessary to put the patient under chloroform. In cases where we cannot replace the uterus, benefit may be derived from simply supporting it with a pessary.

Let us suppose that we are treating a case suitable for reposition, after inflammation has subsided.

1. *Methods of Replacing the Retroflexed Uterus.*

These are the three following:—

(1.) By bimanual vagino-rectal manipulation;
(2.) With the sound;
(3.) By genupectoral posture, combined with traction on the uterus with the volsella and (if necessary) pressure on the fundus with the finger in the rectum.

(1.) The bimanual manipulation is the safest method, and can be at once proceeded with as soon as we have diagnosed the pathological condition. We thus make the diagnosis, form the prognosis, and begin the treatment at one examination. The replacement is best effected

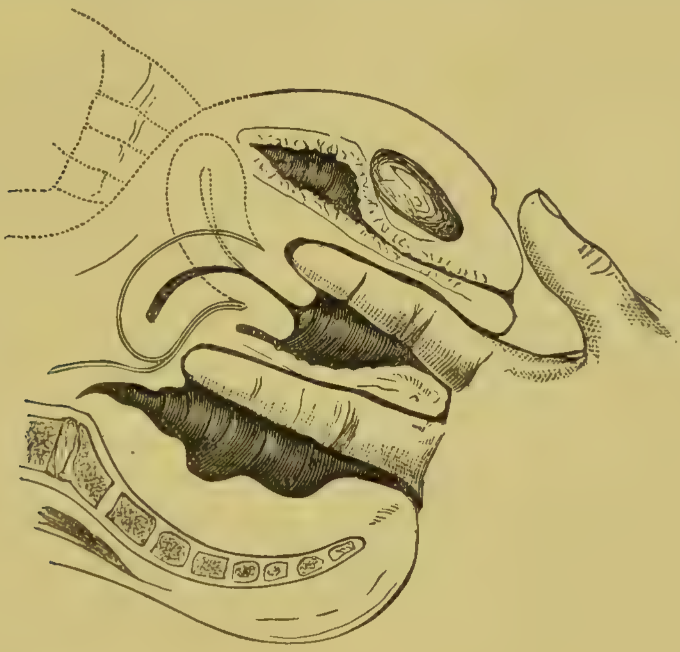


Fig. 210.

Reposition of the retroflexed uterus with the finger in the rectum.

with the index finger in the vagina and the middle finger in the rectum. If with both fingers in the vagina we make pressure through the fornices, we simply push the uterus, as a whole, upwards. With the finger in the rectum, however, we get behind the uterus and push it forwards. Place the patient in the dorsal position; pass the fingers into the vagina and rectum, as in the accompanying diagram (fig. 210). Make steady gradual pressure on the posterior surface of the fundus with the middle finger. Direct the pressure to one side of the middle line, so as to keep the fundus clear of the promontory of the sacrum. With the index finger placed *in front of the cervix*, push it backwards and thus rotate the fundus forwards. Having by this manœuvre brought the fundus uteri to the front (into the position indicated by the dotted line in the diagram), make with the external hand steady downward pressure so as to get between it and the hollow of the sacrum and thus depress the fundus still more to the front. A glycerine plug is now placed in the vagina to keep the uterus in position. The plugging should be chiefly in the anterior fornix, so as to exert upward pressure on the cervix and thus favour the tilting of the fundus forwards. On the following day, if there be no indication of inflammation, a pessary may be introduced.

(2.) Replacement with the sound has the advantage that it causes less discomfort to the patient; it is therefore the method generally employed. We may have the sound already in the uterus to make sure of our diagnosis, and (without withdrawing it) we can proceed at once to effect the reposition. In the employment of force we require to be more careful than in the bimanual manipulation, because the sound gives us greater leverage, the pressure is being made on the mucous membrane of the uterus, and there is not the same delicate sense of resistance as when the finger is immediately in contact with the uterus. The end of the sound should not be too much curved. If the flexion be pretty acute, so that the sound requires to be well curved to pass easily into the body of the uterus, we should first reduce the acuteness of the flexion by repeatedly passing in the sound more and more straightened. Having by this means partially converted the retroflexion into a retroversion, we proceed to reposition as follows. The sound lies as in position 1 in the figure (fig. 211): the direction of the handle is backwards, and the roughened face looks to the back; the intra-uterine portion (1) also has the curve backwards. Now lay hold of the handle loosely, rather allowing it to lie between the fingers than grasping it. Carry the handle upwards towards the patient's right buttock (as she is on her left side) forwards with a wide sweep and downwards again towards the couch, the shaft describing half of a cone. The sound thus comes to lie in position 2 in the figure: the direction of the handle is forwards, and the roughened face is now to the front; the intra-uterine portion of the sound has also rotated, so that the curve is now forwards, but the uterus as a whole is still to the back (fig. 211, 2, 2). Now carry the handle of the sound gently and slowly backwards, in a straight line, towards the perineum. The sound now lies in position 3 : the roughened surface is to the front, but the handle is now directed backwards; the fundus uteri is consequently in its normal position (fig. 211, 3). The reason for this manipulation is evident. If we rotated the handle of the sound forcibly round its long axis (bringing it at once from position 1 to 3), the intra-uterine portion would describe a wide curve within the uterine body and probably produce laceration of the mucous membrane. Before withdrawing the

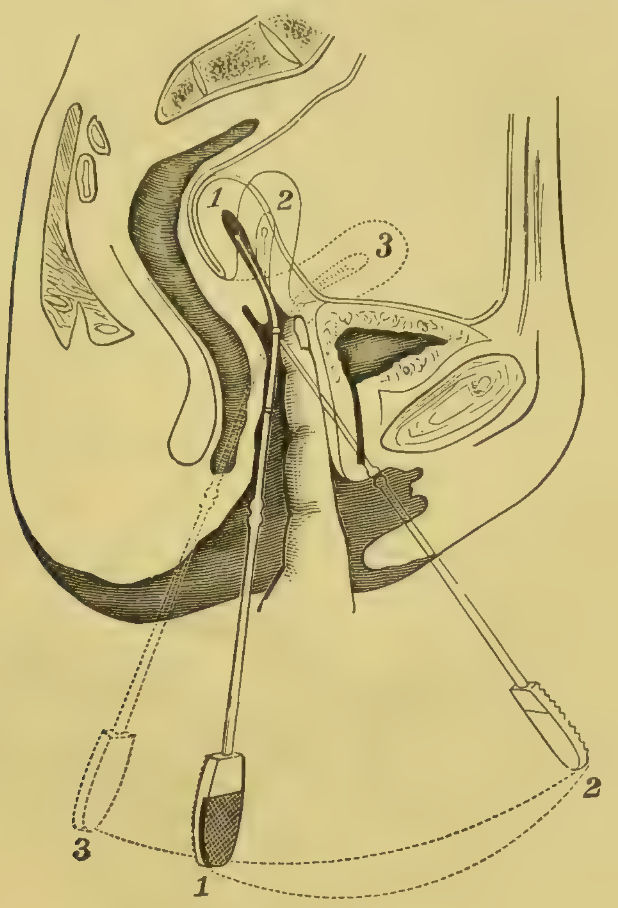


Fig. 211.

Replacement of the Uterus with the Sound. 1, 2, 3 the successive positions of the Sound and of the Uterus.

sound we make sure by external palpation that the fundus uteri is to the front, as the latter is more easily felt when stiffened by the sound. After withdrawal of the sound the uterus must be kept in position by the glycerine plug or pessary. Frequently we find that the uterus falls back into its abnormal position as soon as the sound is withdrawn; in such cases, the pessary should be slipped in over the handle of the sound and put in position before the latter is withdrawn.

Various forms of uterine repositors have been devised by Sims and others. They might be compared to a sound having the intra-uterine portion jointed to the stem, on which it can be rotated antero-posteriorly by a suitable mechanism. They are not of such practical value as to require further description here. No mechanism can equal the fingers in nicety of action.

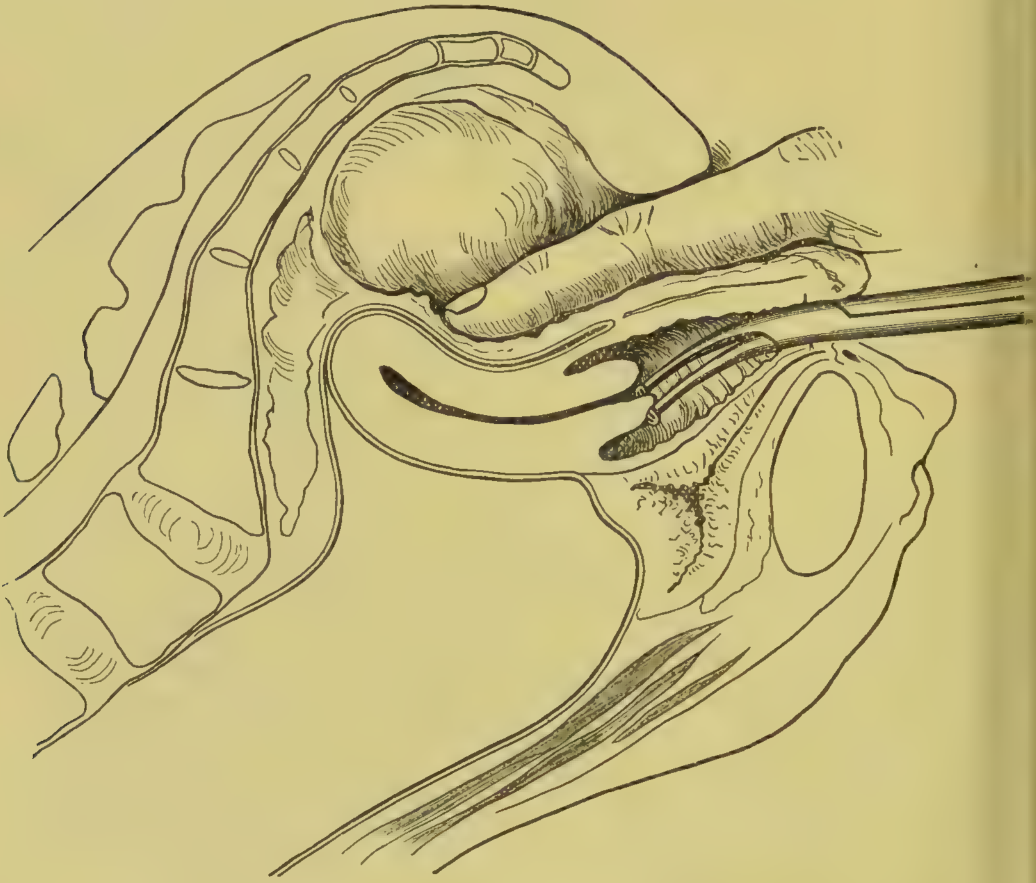


Fig. 212.

Replacement of the uterus with the volsella and the finger in the rectum; the patient is in the genu-pectoral position.

(3.) The importance of the genu-pectoral posture in replacing the retroflexed uterus has been brought forward by H. F. Campbell. On placing the patient in this posture, the abdominal contents gravitate downwards and forwards; this displacement withdraws the internal pressure from the pelvic floor, so as to subject it to the atmospheric pressure from without. If the vaginal orifice be now opened, the vaginal cavity becomes distended with air; if the walls are lax, the cavity may be so large that the finger reaches the cervix with difficulty. The position of the uterus changes;* but the retroflexed uterus does not become replaced, as Campbell supposed. It moves as a whole near the sacrum; and, if already retroverted, it becomes still more so. To effect replacement, we must either push the fundus forwards or draw the cervix backwards. It is best to combine these actions; having laid hold of the cervix with the volsella per vaginam, we draw it downwards while with the index finger of the right hand, per rectum, we press the fundus upwards (see fig. 212). This method of reposition is specially applicable to cases of retroflexion of the gravid uterus.

Having replaced the uterus by one of these methods, we have to retain it in its normal position.

2. *Methods of Retaining the Replaced Uterus.*

The retention of the uterus in its normal position is effected by vaginal pessaries. Of these the best forms are the Hodge or, its modification, the Albert Smith.

The *material* of which they are made is vulcanite, which is light and smooth and not affected by vaginal discharges. To bend the vulcanite, the pessary should be placed in hot, almost boiling, water. It is thus made pliable and can be moulded to the desired form, but becomes firm again on placing it in cold water; this is also effected by oiling

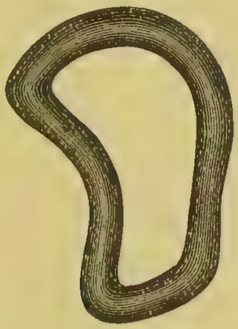


Fig. 213.
Hodge pessary.

---

* For full account of changes produced by the genupectoral posture, the student should consult the Atlas of the Relations of the Abdominal and Pelvic Organs in the Female; Simpson and Hart, 1881.

the pessary and heating it in a spirit lamp. Pessaries are also made of gutta percha, which has the advantage of being easily moulded; these cannot, however, be worn for a long time, as the gutta-percha is absorbent and, retaining the secretions, sets up irritation. The patient can wear one for a few weeks till we see that it fits comfortably and is effective, and then we can substitute one of a similar form made of vulcanite.

The *form* of the Hodge is an elongated horse-shoe, with a straight transverse bar joining the free ends. Seen from the front (fig. 213), it has a curved upper end which is adapted to the posterior fornix; the lower end consists of a straight bar which serves to keep the sides apart, and lies under cover of the symphysis pubis; the external angles of this end are rounded to prevent their cutting the vagina; the sides run almost parallel. Seen from the side (fig. 215), it is a mould of

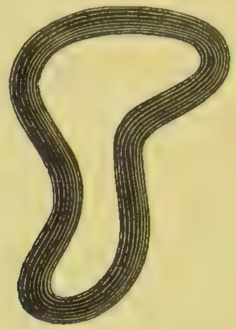


Fig. 214.

Albert Smith Pessary.

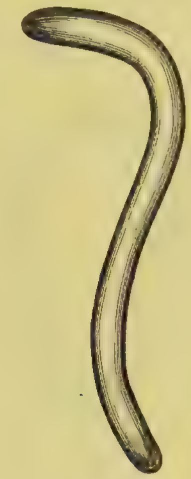


Fig. 215.

Side view of Albert Smith Pessary. The Hodge is similar, but has the lower curve less marked.

the vaginal slit; there is an upper sacral curve, which is long and well-marked; there is a lower pubic one, which is not necessarily present or is only slightly marked. The pessary lies so that the concavity of the sacral curve looks forwards, that is to say, the upper end of the pessary (like the posterior fornix vaginæ) curves forwards. The Albert Smith (fig. 214) contracts in its lower half to a more or less beak-shaped end; seen from the side, it has the pubic curve more marked (fig. 215). Scientifically it is the more correct form, because the posterior wall of the vagina is narrower below than it is above. The lower end should not be too much contracted, otherwise it is apt to interfere with married life; also when the vaginal orifice is wide, it favours the expulsion of the instrument. A second modification of the Hodge is recommended by Thomas, in which the upper bar is thicker, the sacral curve more pronounced, and the whole instrument longer.

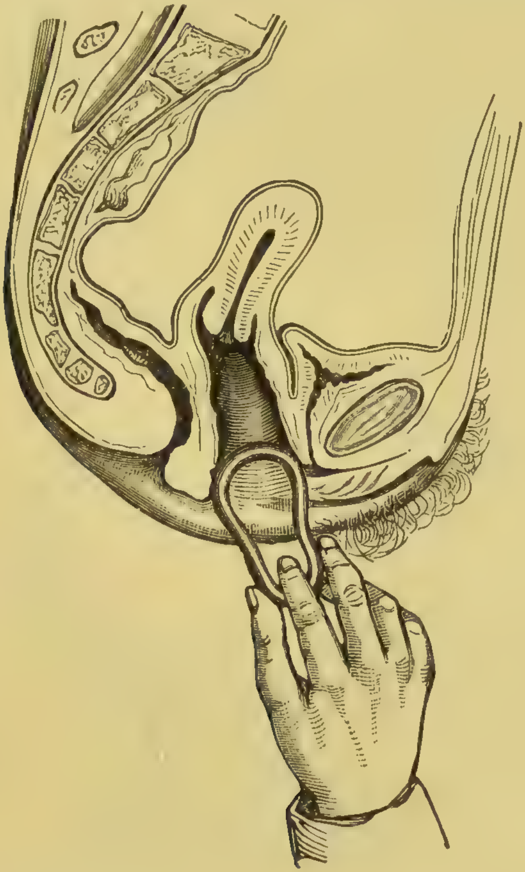


Fig. 216.

Introduction of pessary.

The *choice of an instrument* suitable to the case must be made. The pessary should be narrower and shorter than the posterior vaginal wall, so that it produces no tension when it is in position. The upper bar should be of such a size that it can be passed in easily ; the lower should be narrower than the upper, but not too narrow for the reasons given above. The proof of a good fitting instrument is that the patient does not feel its presence, nor should it interfere with married life.

The *mode of introduction* of the pessary demands special attention. It is important that this apparently simple manœuvre be effected without causing pain to the patient.. From the fact that the vulvar orifice is antero-posterior while the cavity of the vagina is transverse, the instrument must be introduced with its plane surface horizontal (the patient is supposed to be on the side) and afterwards rotated so that this comes to be vertical. From the position of the cervix, the instrument is very liable to run into the anterior fornix. When in position the upper end must curve forwards. Having oiled the instrument, grasp it with the lower end (the square end in the case of the Hodge, the narrower end in the case of the Albert Smith) between the finger and thumb of the right hand. Separate the labia with the first and second fingers of the left hand ; when the vaginal orifice is narrow hook back the fourchette with one finger, or get the posterior corner of the end which is being introduced within the vaginal orifice,

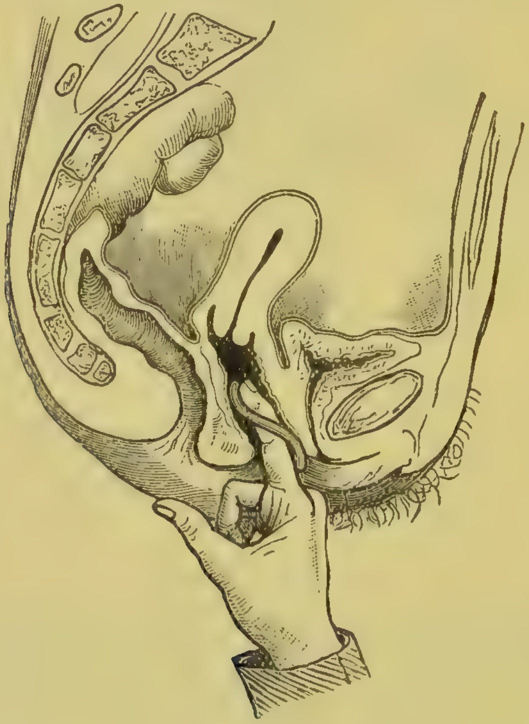


Fig. 217.

Pessary carried on by finger.

and press back the perineum with it so that the anterior corner is not pushed against the clitoris or vestibuli. Now push the pessary backwards in the axis of the vagina till it is half within the cavity (see fig. 216), and rotate it so that the concavity of the sacral curve looks forwards. Pass the index finger behind the instrument into the vagina, and place the tip of it against the upper bar; carry the pessary onwards, keeping the upper bar well against the posterior vaginal wall to prevent its slipping up in front of the cervix (fig. 217).

The *position* and *action* of the pessary when *in situ* are as follows:—It lies exactly adapted to the vaginal walls (see fig. 218); the upper end being in the posterior fornix behind the cervix, the lower just within the vaginal orifice. It is kept in position through its resting on the oblique anterior face of the sacral segment of the pelvic floor, against which it is compressed by the posterior face of the pubic segment.

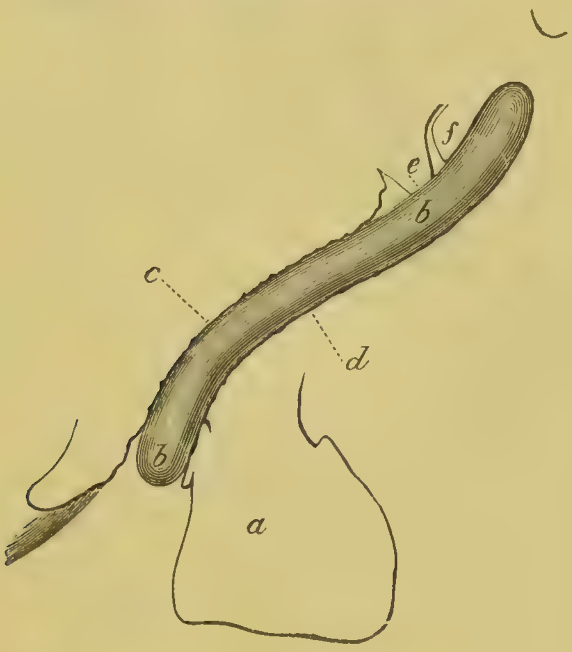


Fig. 218.

Pessary *in situ* in the vagina, *ad naturam*. *a* perineum, *bb* pessary, *c* anterior and *d* posterior vaginal wall, *e* anterior and *f* posterior lip of cervix.

The student will readily understand and remember the position of the pessary in the following way. Hold the hand inclined as in fig. 219, with the palm slightly inflexed. It resembles the posterior vaginal in the following points: (1) it is broader above than below; (2) it curves forwards above; (3) from its obliquity, it allows the pessary to sit on it. Now place the pessary on it. It will only lie adapted to the hand when the broad end is above and the upper curve is directed forwards.

The Hodge pessary does not act as a lever; that is to say, the intra-abdominal pressure does not act specially on the lower bar and depress it, causing the superior one to rise. The intra-abdominal pressure acts nearly equally on both bars, of which fact the student may satisfy himself clinically. Its action is that the *upper bar gives a point d'appui to the posterior fornix.* The posterior vaginal wall runs round the upper bar as on a pulley, and, as it is inserted into the cervix, the latter is thereby drawn upwards and the fundus thrown forwards (fig. 220). The pessary, therefore, has the same action as the utero-sacral ligaments, if we suppose that these keep the cervix backwards. This is only the action in the case of a retroverted uterus which has been replaced. A vaginal pessary, however, gives relief even though we may not be able to replace the uterus. In this case we must suppose that it acts by supporting the uterus as a whole, thus diminishing tension on the ligaments and passive congestion.*

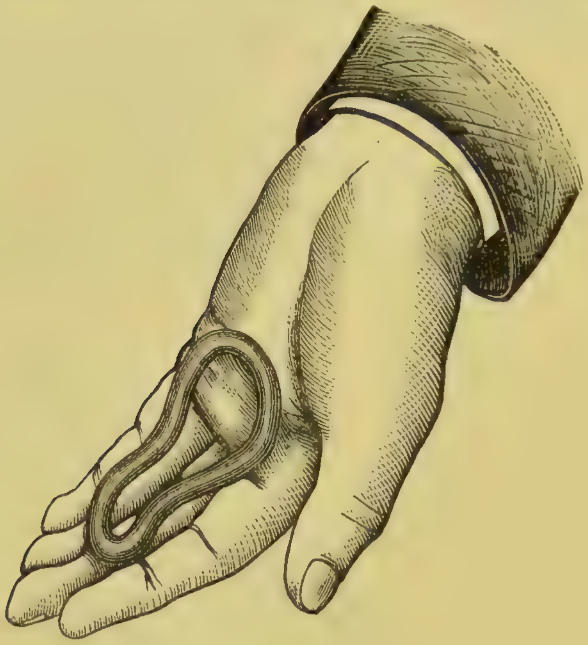


Fig. 219.
Hand holding Albert Smith pessary.

Another way of showing how the Hodge pessary acts is as follows. With the patient lying on her left side, pass the index finger into the posterior fornix vaginæ and push it up in a direction parallel to the

---

* See Hart on The Structural Anatomy of the Female Pelvic Floor; and Granville Bantock on The Use and Abuse of Pessaries, London 1878.

posterior vaginal wall. This necessarily pulls the cervix back, and thus the fundus is kept forward (see fig. 66). In other words, if the cervix be thus kept back by the tension of the finger in the posterior fornix, the uterus cannot become retroverted although the fundus may become retroflexed. Now if a Hodge pessary be passed into position and held by the hand, it will act just as the finger does. It does not require to be held, however, as it rests on the oblique sacral segment and is pressed against it by the pubic segment and abdominal viscera. Note that the pressure on the Hodge is at right angles to the posterior vaginal wall; there is no side to side pressure on the instrument, and thus it does not require to extend from side to side of the vaginal walls.

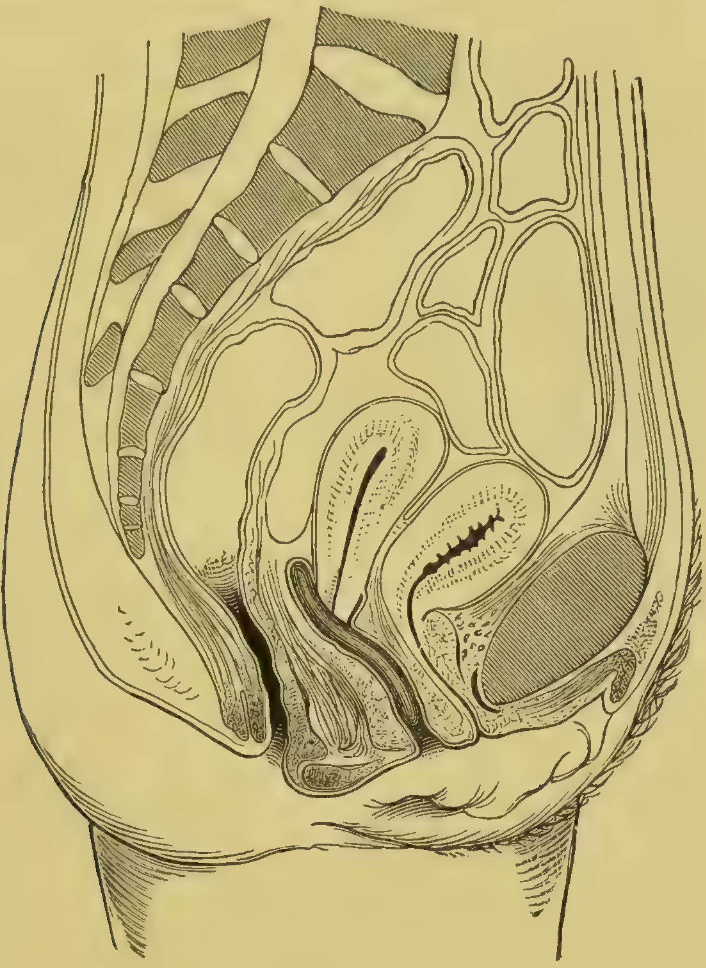


Fig. 220.

Position and action of pessary.

The after-watching of the case is important. The patient should be instructed to return in two days to see that the instrument is in place, and to return at once if it causes pain. After this she should report herself occasionally, say at intervals of a month, when examination is made to ascertain that the uterus keeps its place. If she uses hot water injections occasionally, it is not necessary to remove the instrument to clean it more frequently than this. After the pessary has been worn for some months, it may be removed to see if the uterus remains in position without it. Sometimes we find that the uterus falls back again into its abnormal position as soon as the instrument is withdrawn; in such a case, it must be introduced again and may have to be worn for years. Should conception occur, the pessary may be worn till the fourth month, after which the uterus rises above the brim and there is no longer reason to fear displacement.

In some cases the uterine tissue is flaccid at the angle of flexion, and the body falls to the back or front as if it were jointed to the cervix. Here the Hodge, which acts on the body through the cervix, does no good; the intra-uterine stem, along with a Hodge which has transverse bars, does good in some of these cases. Wynn Williams has devised a good form of pessary on this principle.

From what has been said on the action of the Hodge pessary, it is evident that in the treatment of Retroversion + Retroflexion *the version alone is affected by the pessary.* Whether the flexion is remedied will depend on the state of the uterine walls and the effect of intra abdominal pressure upon them.

CHAPTER XXXII.

INVERSION OF UTERUS.

LITERATURE.

Atthill—Inversion of uterus due to fibroid tumour: Dublin Medical Journal, Feb. 1879. *Barnes*—Op. cit., p. 721; and Med. Chir. Trans., 1869. *Crosse*—An Essay, literary and practical, on Inversio Uteri: Trans. Provincial Med. and Sur. Assoc., London 1845. *Duncan, Matthews*—On the Production of inverted uterus: Edin. Med. Jour., May 1867. *Emmet*—Principles and Practice of Gynecology: Churchill, London 1880, p. 410. *Fritsch*—Die Lageveränderungen der Gebärmutter: Billroth's Handbuch für Frauenkrankheiten: Stuttgart 1881. *M'Clintock*—Diseases of Women: Dublin 1863, p. 76. *Macdonald*—Two cases of chronic inversion of the uterus: Edin. Obst. Trans., vol. VI., p. 170. *Spiegelberg*—Archiv. f. Gyn., IV. S. 350, and V. S. 118. *Thomas*—Op. cit., p. 453. The essay by Crosse gives the fullest anatomical description of inversion, and contains a series of lithographic plates of specimens. The literature up to 1879 is fully given by Fritsch. Other references are given as foot-notes.

PATHOLOGY.

In inversion the uterus is turned inside out, so as to form a polypoidal projection into the vagina; its peritoneal surface is converted into a cup-shaped hollow; its mucous membrane becomes *everted* so as to lie exposed on all sides in the vagina.

The mechanism by which this condition is brought about is the following.

1. A portion of the muscular wall of the uterus *having lost its tone*, becomes depressed towards the uterine cavity. In the puerperal condition this is usually that portion of the wall to which the placenta has been attached, and the condition has been described by Rokitansky as "paralysis of the placental seat;" this partial inversion will be frequently found on abdominal palpation in cases of post-partum hæmorrhage (Fritsch). In cases of tumour growth, fatty degeneration (Scanzoni) or malignant infiltration (A. R. Simpson) weakens the wall of the uterus round the base of the polypoidal growth, and thus produces an analogous condition.

2. *Muscular contractions* of the non-depressed portion of the uterus, combined with *intra abdominal pressure*, carry the depressed portion

further into the uterine cavity, until the fundus uteri reaches the os internum (fig. 229). In the puerperal condition, muscular contractions are present of themselves or are produced by the presence of the placenta ; in the case of a polypoidal tumour, they are due to the presence of the foreign body. *Traction from below*, such as the pulling away of the placenta or the tension of the pedicle of a polypus which is being extruded, also produces inversion.

3. The fundus of the uterus, by continuation of the same process, dilates the cervical canal and is 'born' into the vagina (fig. 226).

In some cases inversion seems to take place from below upwards with a mechanism similar to that of prolapsus uteri, the lower part of the body of the uterus becomes inverted into the cervical canal (Taylor).

Matthews Duncan, whose paper was a valuable contribution towards establishing the correct theory of inversion, distinguishes between active and passive inversion. The active is that described above ; the passive is produced by inertia of the whole uterus, in which the organ is driven down entirely by intra-abdominal pressure or by traction from below—and not by uterine contractions.

It is evident that the process may become arrested at any of these stages and persist as a permanent condition. When it has persisted for a few weeks, it constitutes "chronic inversion;" this is found in the following forms. (1.) Inversion of one horn only is a rare occurrence. Slight inversion of the uterine wall, at the base of a polypoidal fibroid, has been more frequently observed. (2.) Partial inversion, when the fundus has descended as far as the os internum, is also found as a chronic condition. (3.) Complete inversion is the condition most frequently met with.

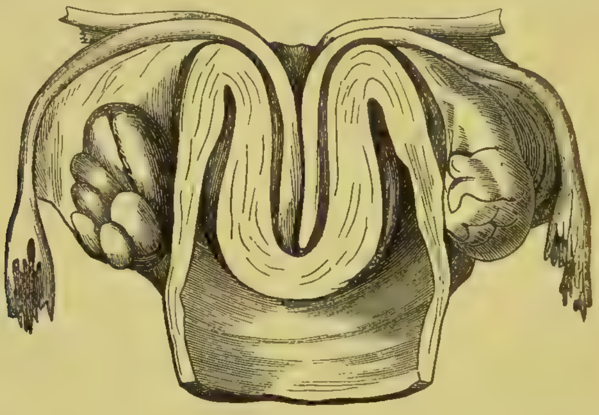


Fig. 221.

Inversion of uterus (half-size, Barnes from Crosse's essay). The fundus lies in the vagina; the cervix is not inverted; the lips are flattened out to a swelling seen below the angle of inversion. The ovaries (seen from behind) are not in the peritoneal sac.

An exact knowledge of the relation of parts in *complete inversion* is necessary for diagnosis and treatment. This can only be gained by studying the inverted uterus as seen in section (fig. 221). We must study the position of—

The body of the uterus,
The cervix uteri,
The Fallopian tubes and ovaries,
The peritoneum,
The bladder.

The body of the uterus. The inversion extends, in simple uncomplicated cases (see below), as far as the os internum but *no further.* The uterus lies partly in the vagina, partly in the cervical canal. Its neck is embraced by the os externum, which may lie loosely on it (favouring hæmorrhage) or constrict it firmly (favouring gangrene). After involution takes place, it becomes small, rounded and of firm consistence, closely resembling a pediculated fibroid tumour; and it has been amputated by mistake for such. It has a rounded form, is of a softer consistence and deeper red colour than a pediculated fibroid, and has a smooth and slippery surface which bleeds freely when handled. The softness may be so marked that the uterus moulds itself to the vaginal cavity and, becoming flattened against the posterior vaginal wall, takes on a mushroom-like form (Freund).

The mucous membrane of the uterus may undergo all the changes of any tumour with a constricted base and exposed surface. It is usually congested and bleeds easily; it may become ulcerated and even gangrenous, or may be hypertrophied with polypoidal formations; it may lose its single layer of cubical epithelium and develope a stratified squamous epithelium. The occurrence of these changes has an important bearing on the desirability of replacing the organ.

The cervix uteri. This is rarely* displaced in simple uncomplicated inversion; it forms a broad ring embracing the neck of the tumour. Sometimes the inversion is complicated with prolapsus, or, more properly, the vagina also becomes inverted and the inverted uterus caps the inverted vagina (fig. 222). When this occurs, the cervix uteri is also more or less inverted; a part remains just above the os externum, as a depressed ring which also disappears on making traction on the uterus (Fritsch).

The *Fallopian tubes and ovaries,* with some coils of small intestine, may (at first) lie within the inverted cup, which is lined with *peritoneum;*

---

* Crosse figures one preparation in which the cervix was inverted although there was no prolapsus.

afterwards, they retract out of it. In long-standing cases, the rim of the peritoneal cup is contracted by the muscular fibre of the cervix so as

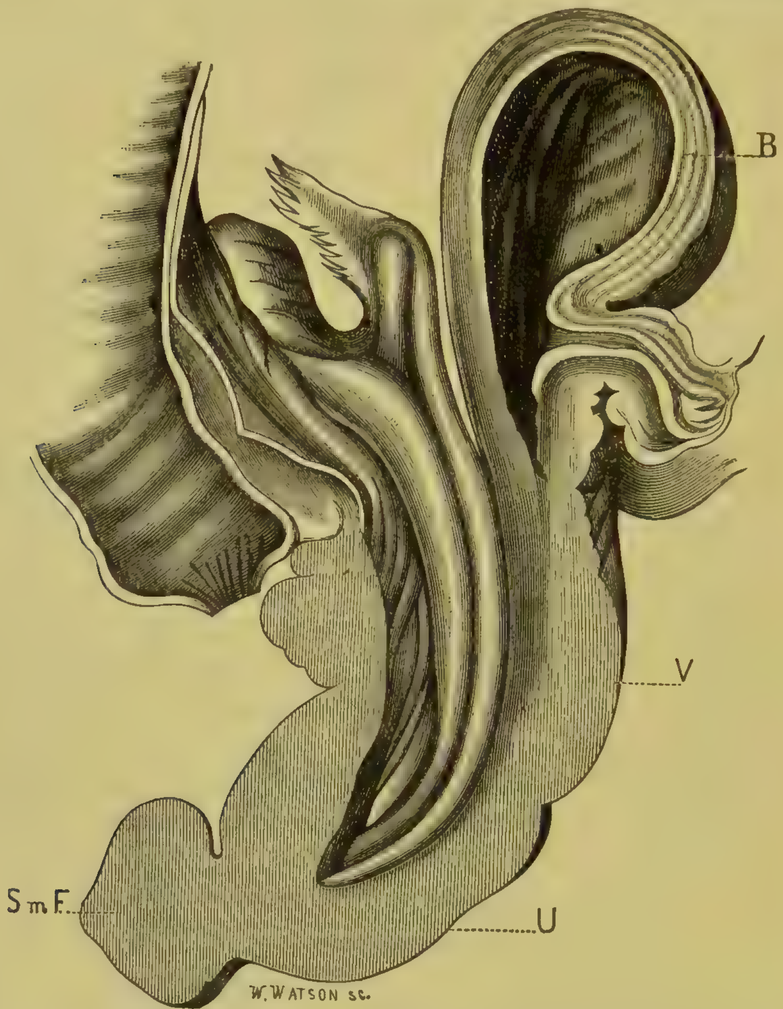


Fig. 222.
Inversion of uterus+inversion of vagina, occasioned by a small sub-mucous fibroid (M'Clintock). *Sm F*, sub-mucous fibroid. Other letters as before.

scarcely to admit a finger (fig. 223). In a case of six months standing, in which A. R. Simpson performed Thomas' operation before having recourse to amputation, the contracted ring just admitted the finger; an ovary was caught within it.

Adhesions rarely form between the *peritoneal surfaces;* this is an interesting fact and is of importance in regard to replacement. We might have expected detachment of the peritoneal lining or tearing of it by the sudden dislocation; the previous stretching of it during pregnancy is perhaps the reason why this has not been noticed. Fritsch says that the lifting up of the fornices by the tumour in the vagina, diminishes the strain on the peritoneum.

The *bladder*, from its relation to the cervix (*v.* Chap. III.), is not altered in position unless there is prolapsus. When the latter occurs, there is

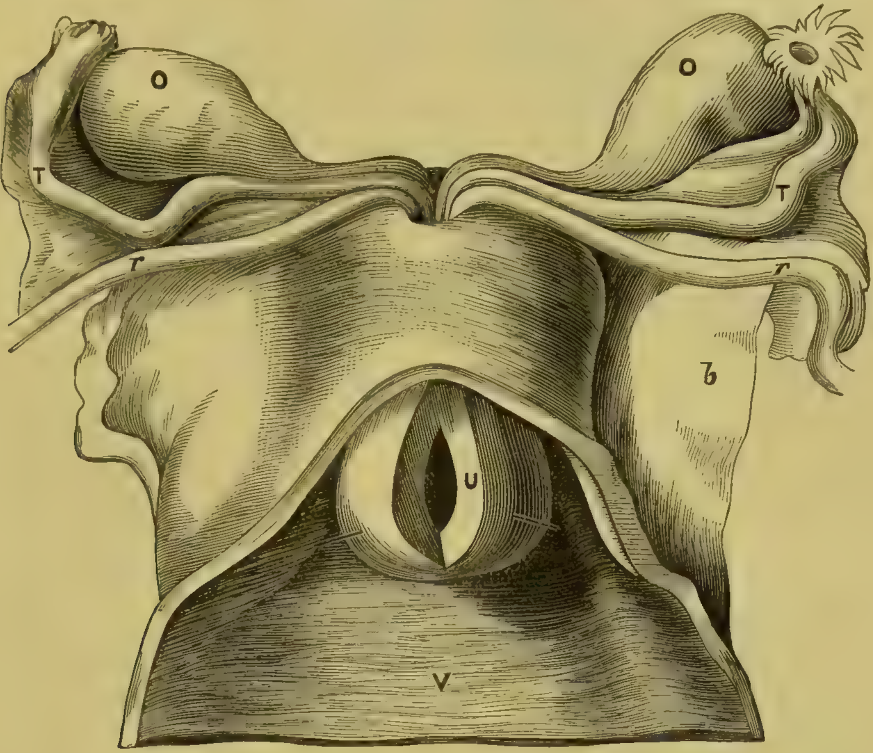


Fig. 223.

Inversion of uterus (Crosse). The inverted uterus (*U*) lying in the vagina (*V*) is cut open to show the peritoneal sac which does not contain the ovaries (*O*); bristles are passed into uterine orifices of tubes.

cystocele (*v.* fig. 222). We may therefore contrast the two types of inversion as follows :—

Inversion of uterus, cervix and bladder normal in position;

Inversion of uterus + prolapsus (*i.e.*, inversion of vagina), cervix inverted and cystocele.

ETIOLOGY AND FREQUENCY.

Inversion arises under two different conditions.

1. In the puerperium—puerperal inversion;
2. Secondary to intra-uterine tumours growing from the fundus.

Inversion has also occurred independent of the puerperal condition and of tumour growth; this is quite exceptional.

1. *Puerperal inversion.* This is by far the most frequent form; out of 400 cases, 350 occurred in the puerperal uterus (Crosse).

Its frequency was formerly due to improper management of the third stage of labour. When the uterus was flabby and not contracting and the placenta not coming away, the removal of the latter by traction on the cord drew down the part of the wall to which it was attached and thus inverted the uterus. This accident was favoured by the situation of the placenta over the fundus (Hennig). Since the removal of the placenta by compression (which is best done by the Credé method—with the thumbs of both hands well down behind the fundus so that the uterus may be firmly compressed antero-posteriorly) has been enforced, this accident has become rarer.

A dilated condition of the uterus (distension by blood clots) or a flaccid condition of the walls favours inversion.

2. *Inversion secondary to uterine tumours* is much rarer. Of 400 cases, only forty (ten per cent) arose in this way (Crosse). It has been observed with pediculated fibromata (fig. 222), and will be referred to again when we treat of them (*v.* Chap. XXXVI). It is peculiarly frequent in sarcoma (*v.* Chap. XLI). We know of no case where it has followed on carcinoma uteri; Barnes describes a specimen in which both conditions were present, but does not say which was the primary lesion.

SYMPTOMS.

The symptoms produced by inversion at the time of its occurrence, concern the obstetrician rather than the gynecologist. There is the feeling of something giving way in the pelvis, accompanied with pain, hæmorrhage, and sometimes collapse. With complete inversion, there is retention of urine. It often occurs, or at least becomes so marked as to attract the patient's notice, when she has made a straining effort. The cases where the patient says that it first came down several days after labour, are to be explained by supposing that partial inversion occurred after labour but only the final stage attracted attention.

If the uterus be not replaced at the time, the case becomes one of chronic inversion. The symptoms of chronic inversion are—

Hæmorrhage,
Pain in the pelvis of a bearing-down character,
Anœmia and weakness.

Hæmorrhage is the most dangerous symptom. The menstruation is always profuse, as may be easily understood from the fact that the mucous membrane is extended in its area and lies exposed in the cervical canal and vagina. There is also inter-menstrual hæmorrhage, which comes on unprovoked or on straining.

The *bearing-down pain* in the pelvis resembles that felt in prolapsus uteri. It varies indefinitely in intensity; sometimes it is very acute, rarely is it so slight that the patient becomes reconciled to her discomfort and is able for work.

The *anœmia* and *weakness* may be so marked as to cause suspicion of malignant disease.

DIAGNOSIS.

The diagnosis of *recent inversion* is easy. If the placenta has not yet been expelled, the hands laid on the fundus to expel it by the Credé method find that the rounded fundus is replaced by a cup-shaped hollow. The cervix is sometimes lifted up by the inverted uterus, so as to be "high above the pubes, even near the umbilicus" (Crosse). On passing the hand into the vagina to remove the placenta, care is required to recognise what is placenta and what is inverted uterus, and not to increase the inversion in detaching the placenta. If the placenta is already expelled, the hand on the abdomen recognises the same condition; while a large soft body, varying in size according to the extent of the inversion, fills the vagina.

Chronic Inversion. Before the sound and the Bimanual came to the gynecologist's aid in diagnosis, it was impossible to diagnose this condition with certainty. Mistakes were committed by the most eminent surgeons, just because they had not the means of examination which we now possess. Even now-a-days mistakes occur through the hasty making of a diagnosis before all the means of examination have been employed. We therefore describe fully the routine examination.

1. Pass the fingers into the vagina; a rounded and firm or flattened and soft tumour, which bleeds easily, is felt in the vaginal cavity. Sweep the fingers round it, and recognise that it is free on all sides except at its upper extremity. Round this extremity is felt the cervix, the lips and fornices being recognised; or the cervix is thinned out to a ring and the fornices obliterated. If the cervical canal be obliterated by adhesions, the finger will not pass farther up; if it be patulous, it will pass for one-and-a-half to two inches and find that the cervical mucous membrane is reflected equally all round on to the neck of the tumour.

2. With one finger in front of the tumour and the other behind it, lift it up towards the abdominal wall which is depressed with the external hand till the fingers in the vagina are in contact with it. The external hand feels, in the place of the fundus uteri, a truncated body with a depression in the centre (see fig. 226).

3. Now pass one finger into the rectum, which first comes on the body in the vagina: drag this body downwards with the noose represented at fig. 224, as the volsella causes hæmorrhage; the finger in the rectum, reaching the upper border of the body, can thus feel that it ends abruptly and can pass into the cup-shaped end. Now depress the

abdominal walls till they reach the finger in the rectum, or pass a sound into the bladder and direct the point of it backwards till it can be touched by the rectal finger.

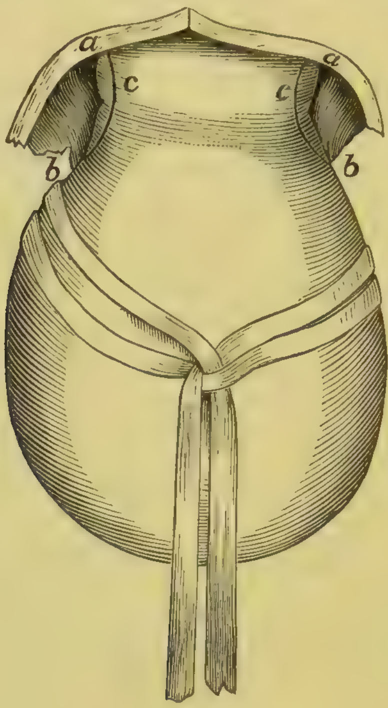


Fig. 224.
Inverted Uterus drawn down by tape-noose; *a. c. b.* line of incision in cervix in Barnes' operation (Barnes).

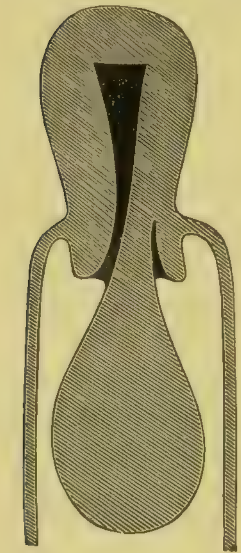


Fig. 225.
Uterine polypus (after Thomas). The uterus in its normal position. Sound passes into uterine cavity.

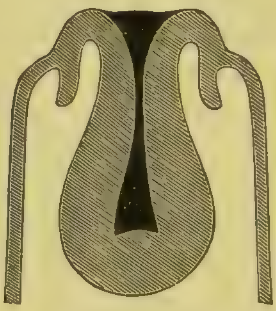


Fig. 226.
Inversion of uterus (after Thomas). A cup-shaped depression is in the place of the uterus. Sound arrested at angle of flexion.

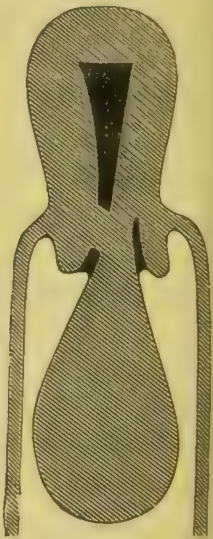


Fig. 227.
Uterine polypus. Adhesions round pedicle obliterate cervical canal.

4. The sound may be used to probe round the neck of the body where there is not space for the finger to pass upwards. It is most useful, however, in differential diagnosis.

DIFFERENTIAL DIAGNOSIS. Inversion must be differentiated from the following conditions :—

1. Polypus in the vagina, simple or with adherent pedicle ;
2. Intra-uterine polypus ;
3. Uterine polypus with partial inversion ;
4. Prolapsus uteri ;
5. Inversion and prolapsus.

1. In a uterine polypus which lies in the vagina, the fundus will be found to lie somewhere else than in the vagina ; it may be retroverted and thus escape recognition in the bimanual ; the rectal examination will then discover it. Having found what we suppose to be the fundus, pass the sound along the side of the pedicle ; if it is in the uterus, the sound passes more than 2½ inches ; if it passes 2½ inches or less, suspect that partial inversion complicates the polypus.

When there are *adhesions round the pedicle obliterating the cervical canal*, a careful bimanual will reveal the fundus in its normal position and justify us in breaking down the adhesions with the sound so as to effect a passage into the uterine canal (fig. 227).

2. In a uterine polypus which is still *intra-uterine* the differential diagnosis is more difficult. A case has been recorded in which inversion of one horn of the uterus was diagnosed and amputated as a polypus. A careful examination per rectum under chloroform might detect the cup-shaped depression found in partial inversion ; the uterine

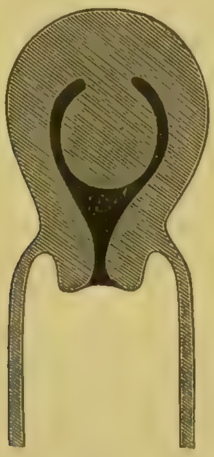


Fig. 228.

Polypus still intra uterine (after Thomas).

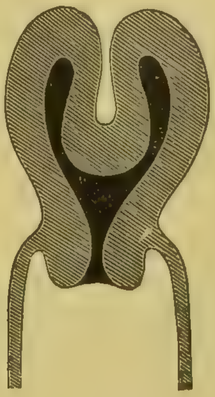


Fig. 229.

Partial inversion of uterus (after Thomas). Cavity of uterus relatively too large.

cavity is always enlarged when a polypus is present (fig. 228 and fig. 229).

3. Having satisfied ourselves that there is a polypus, the possibility of there being *partial inversion* of the uterus at its attachment must be kept in view (fig. 230). A careful rectal examination might reveal a depression on the peritoneal aspect of the uterus. The greater sensitiveness of the uterine mucous membrane also helps us; thus if we apply the ecraseur without chloroform—which is not necessary—to remove the polypus and the patient has great pain on our tightening up the wire, we may suspect that the loop has embraced the wall of the uterus.

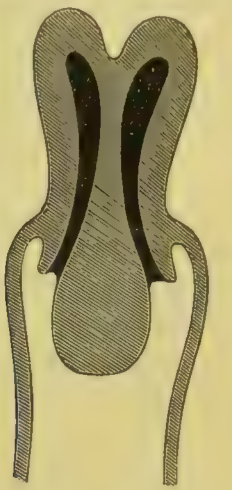


Fig. 230.
Uterine polypus + partial inversion.

4. *Uncomplicated prolapsus uteri* would only on a very superficial examination be mistaken for inversion. The obliteration of the fornices, the presence of the os externum at the end of the protruded tumour, and that of the uterus within it—as demonstrated by the sound and examination per rectum—show that it is a case of prolapsus. If, however, the prolapsus be due to a fibroid tumour of the cervix and the os externum be closed by adhesions or distorted in position, diagnosis is more difficult (*v.* Uterine Polypi).

5. *Prolapsus + inversion* is a rare condition. The specimen represented at fig. 222 is quite unique; the apex of the tumour protruding through the vulva consists of a submucous fibroid, the inverted uterus constitutes the next portion, while the base is formed by the inverted vagina.

COURSE AND RESULTS OF CHRONIC INVERSION.

Spontaneous reinversion and cure has been observed in twelve cases (Thomas). From the rarity of its occurrence it is to be regarded as a gynecological curiosity rather than a natural termination; the mechanism of its production is not as yet known.

Toleration of the condition is also rare, though cases are reported in which the uterus has become reconciled to its new position and surroundings and the patient has recovered perfect health.

The greater proportion of unrelieved cases end fatally through anæmia, hæmorrhage, septicœmia, or peritonitis.

PROGNOSIS.

As to the hope of reduction—of sixty-six cases collected by Macdonald, forty-four were successful.

TREATMENT.

The reposition of the inverted uterus is one of the gynecological triumphs of the last five and twenty years. Up to 1856 when Tyler Smith effected reposition by gradual compression with an air pessary, the only hope of cure was by amputation with the many risks attendant on that operation. About the same time White of Buffalo (1858) independently succeeded in replacing an inversion by pressure with the hand. After these, a number of successful cases are recorded among which the most note-worthy is one of Nœggerath who replaced an inversion of thirteen years' duration.

Various methods of reduction have been recommended by Tyler Smith, White, Emmet, Courty, Nœggerath, Thomas, Matthews Duncan, Barnes, Braxton Hicks, and Tate. It would take too much space to describe each method in detail; the references will enable the student to consult the original articles.

The treatment of inversion is best considered as follows:—

A. Reposition (*a*) with the hand alone or aided by instruments,
(*b*) by continuous slight elastic pressure;
B. Amputation.

A. *Reposition.*

The obstacle to reposition is the resistance of the muscular fibre of the lower segment of the uterus; the principle of treatment is to wear out the muscle by steady pressure.

Suppose that we have a case of inversion, how are we to proceed? The patient is kept perfectly at rest for a few days; injections of very warm water are employed twice or thrice daily; a liberal diet is given, and iron is usually required for anœmia. Ergot is required if there is menorrhagia; should it not be the menstrual period, the best thing to check hæmorrhage is injection of very hot water.

Having thus prepared the patient, we proceed to reposition. Are we to employ the more rapid manual method or the slower one with an instrument? If the patient does not object to an operation under chloroform and if we can have assistants to take turns with us in keeping up manual pressure, the former method should certainly be tried first.

(*a*). *Reposition with the hand alone or aided by instruments.* For a few days previously, the largest size Barnes bag which the patient can bear is placed in the vagina and distended; this makes space for the operator's hand, and may itself effect the reposition.* The patient, under chloroform, is placed in the lithotomy position; pass the right hand into the vagina, and grasp the uterus with the fingers as far into the angle of reflection as possible (fig. 231). Now press the uterus steadily upwards against the left hand on the abdomen. The fingers may be separated as far as possible so as to open out the cervix.†

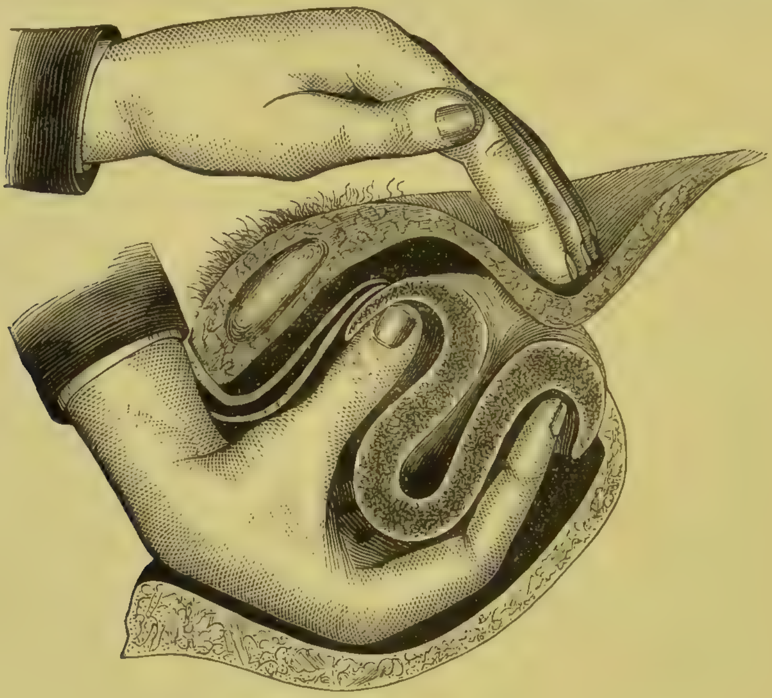


Fig. 231.

Reposition of the inverted uterus with the hand alone (after Emmet).

Sometimes the process of reinversion is started by dimpling inwards one horn of the uterus, and then forcing the depressed horn onwards as a wedge to open up the ring of the cervix.* As the hand cannot keep up steady pressure for any length of time, a cup is set on a curved iron rod with a spiral spring† to make the pressure equal. A curved wooden rod, with a large cup at one end and a small one at the other, has also been used to keep up pressure.‡ The end of the instrument is pressed against the operator's chest, and the cup is steadied with the hand in the vagina. It is evident that these instruments require a roomier vagina than when the hand alone is used ; and if the cup slips unexpectedly it may rupture the fornix. Counter-pressure is made over the abdomen with the hand, or, if the abdominal walls are thin and there is a distinct cup on the peritoneal aspect, with a cone of wood§ which is used to distend the ring of the cervix ; the traction can be taken off the vaginal walls by fixing the cervix with volsella.|| Counter-pressure may be made per rectum in the following way :—Pass index and middle fingers of right hand into rectum, draw down the uterus with the left hand or the

---

* Kroner has collected six cases of inversion (longest of eleven years standing) replaced by this means; the pressure was applied for periods varying from one to eleven days. Archiv. f. Gyn., B. xiv., S. 270.

† Emmet—Op. cit., p. 424. It is very doubtful whether the constricting cervix has anything to do with preventing reposition, though upward and outward pressure round the neck favours it.

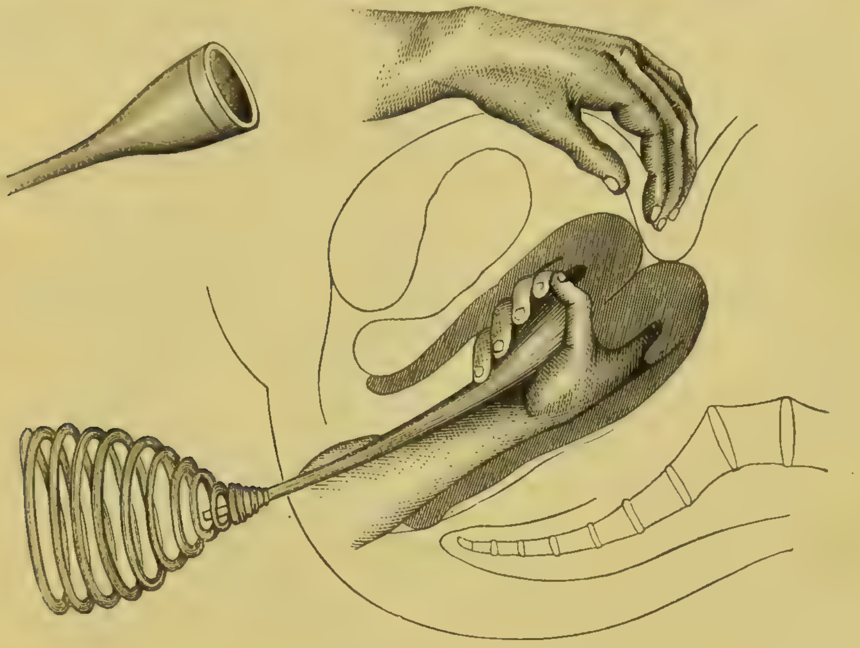


Fig. 232.

White's Repositor, with elastic spring placed against the operator's chest. While the right steadies cup and uterus, counter-pressure is made with the left hand or better by an assistant (Thomas).

* Nœggerath—Am. Med. Times, 1862, vol. iv., pp. 230, 235.

† White—Intern. Med. Cong. Trans., Philadelphia, 1876. Byrne—New York Med. Journ., Oct. 1878.

‡ Atthill—Loc. cit. Braxton Hicks—Brit. Med. Journ., Aug. 1872.

§ Thomas—Op. cit., p. 468.

|| Schrœder—Op. cit, S. 203. Atthill—Loc. cit.

noose (fig. 224) until these fingers get fairly above the cervix so as to press on the margins of the peritoneal depression ; grasp uterus now with left hand, turning it so that the fundus is towards the symphysis and the cervix towards the sacrum ; finally, make pressure with the index and thumb in the angle of reflection against the two fingers in the rectum.* The urethra has also been dilated so as to allow one finger to press on the anterior rim of the depression, while the rectal finger presses on the posterior.† To weaken the resistance of the cervix, lateral incisions have been made into its substance (Barnes ; see fig. 224).

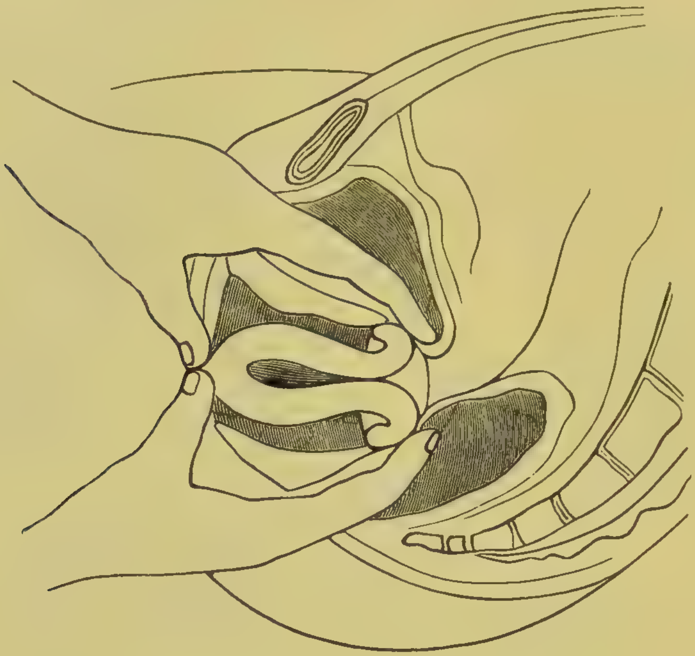


Fig. 233.

Tate's method of making counter-pressure with fingers in bladder and rectum (Mundé).

This manual pressure is, with the help of assistants, to be kept up from half-an-hour to two hours according to the condition of the patient. If not successful in this time, the patient is kept in bed and under the influence of opium while a Barnes bag is placed in the vagina to maintain the uterus as far as it has been replaced. When the uterus has been so far re-inverted that the fundus is above the level of the os externum, the lips of the latter may be drawn together with wire sutures.‡

* Courty—Maladies de l'utérus, 1866.

† Tate—Cincinnati Lancet and Observer, March 1878.

‡ Emmet—Op. cit., p. 437.

Abdominal section, so as to allow the operator to get at the constricting rim of the cup from its peritoneal side and dilate it with expanding forceps, has been proposed by Thomas. It was successful in the first case; a second proved fatal from peritonitis. A. R. Simpson tried it in one case before having recourse to amputation, but could not dilate the ring.

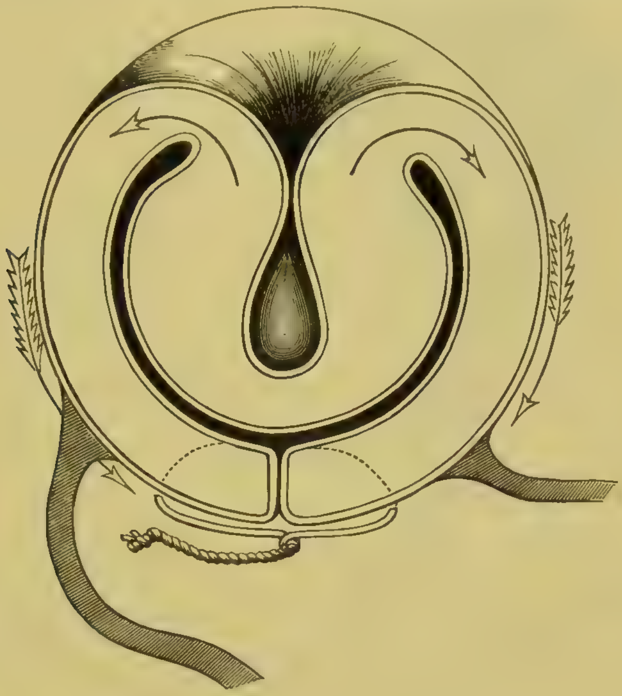


Fig. 234.

Emmet's method of retaining the partially re-inverted fundus by closing the os externum with sutures: the traction, produced in the direction of the arrows, favours re-inversion (Emmet).

(*b.*) *Reposition by continuous slight elastic pressure.* If manual reposition has failed, we try the more gradual method; in some cases we employ it from the first. It is effected by the use of an air-bag, or of a wooden cup set on a stem* with a vaginal (or, better still, a vaginal and perineal) curve, so that the pressure is made in the axis of the brim. Pressure is made by four elastic bands which pass, two in front and two behind, to a broad abdominal bandage; by the tightening of the front or the back bands, the direction of pressure is altered.

In this method there are two points which require careful attention. (1.) The elastic pressure must always act in the line of the axis of the inverted uterus, and likewise of the axis of the pelvic brim; the cup is apt to slip off the uterus, and the handle of the instrument to alter its direction. *Pressure in a wrong direction is injurious, and may produce sloughing.* To prevent these accidents we pad, with wadding

---

* Lawson Tait—Obst. Journ., vol. vi., p. 555.

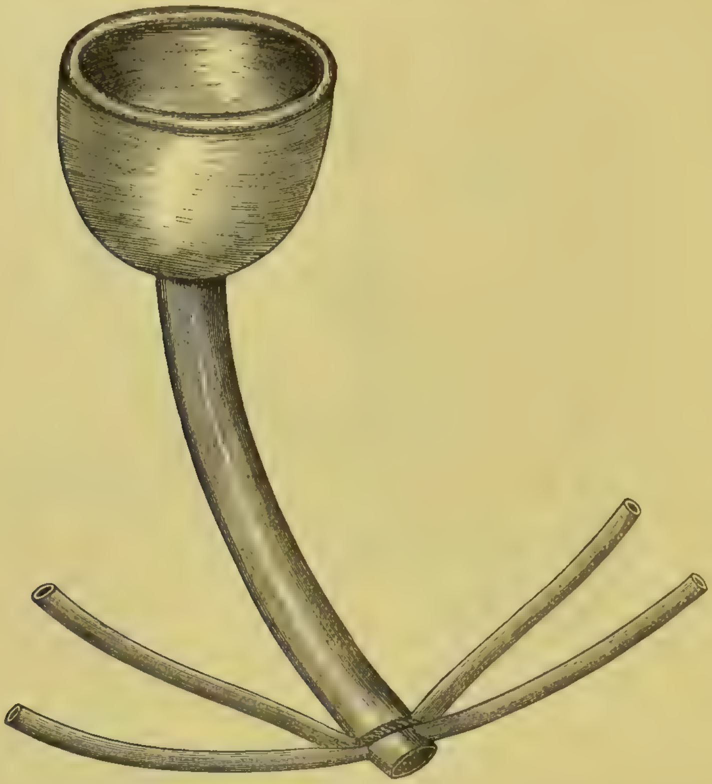


Fig. 235.

Cup with stem and elastic bands which are fixed to an abdominal belt, for gradual reduction of inversion (Thomas).

soaked in carbolized oil, all round the neck of the inverted uterus and round the cup of the repositor when *in situ;* we watch the position of the instrument, and remove and re-apply it every day so as to see how it is pressing and whether there is sloughing.

(2.) There must be effective counter pressure, so as to take the strain off the vaginal walls. This is effected by means of a broad flannel bandage, firmly secured round the loins, under which cotton wool is padded in such a way as to press exactly upon the fundus.

The elastic pressure may be kept up from one to three weeks. Cases of reposition at this period, or even after it, are recorded.

In cases of inversion due to tumour growth, the tumour—if simple—must be removed in the first instance; we then wait to see if the uterus will replace itself, and if it does not we proceed as above. If the tumour be malignant, the propriety of amputating the uterus with the tumour must be considered.

B. Amputation.

Amputation of the inverted uterus is justifiable (except in cases of malignant disease) only after all means of reposition have been fairly tried and failed, or when the uterus is extensively ulcerated and gangrenous. The length of duration of the inversion is no argument for amputation; Nœggerath replaced one of thirteen years' standing.

The mortality in amputation is high, 1 in 3 (Crosse). The dangers of the operation are—

Hæmorrhage,
Septicœmia,
Peritonitis,
Retraction of the stump into the peritoneal cavity.

We describe the operation as we have seen A. R. Simpson perform it with success.

The following are the instruments required:—

Vaginal douche,
Elastic ligature,
Sims' speculum,
Spatulae,
Volsella,
Dissecting and artery forceps,
Bistouries,
Scissors,
Long straight fixed needles,
Smaller curved needles and holder,
Silver wire—two thicknesses,
Carbolised silk and catgut.

Place the patient in the lithotomy posture, under chloroform. Keep up irrigation with the douche during the whole operation. Hook back the labia with spatulae, to be held by the assistants who steady the legs; draw down the perineum with Sims' speculum, to be held by another assistant.

Ascertain before making any traction on the uterus where the natural neck of the inverted portion lies, and pass round it an elastic ligature knotted so as to control hæmorrhage. The natural neck is our guide as to the line of amputation; if we drag more of the uterus down into the constricting loop, the stump is liable to spring back after the amputation has been performed.

Pass three or four wire sutures through the uterus in an antero-posterior direction, about an inch below the constricting ring, as described under the operation for amputation of the cervix (*v.* p. 255); the same figures will show how the sutures are passed in this operation, if we suppose the inner circle (which represents the mucous membrane of the cervical canal in fig. 164) to represent the cross section of the peritoneal pouch. The advantages of passing these sutures before amputating are the following: they are ready *in situ* to control hæmorrhage; they give us a purchase on the stump when the portion in the bite of the forceps is cut away; they are more easily passed at this stage.

The uterus is now amputated about half an inch below these sutures. Bleeding points of any size are ligatured with catgut on the end of the stump. The lips are then brought together with the deep sutures already passed. More superficial ones are placed between these to bring the mucous membrane together. The india-rubber constrictor is now notched so as to diminish its pressure, and finally cut through. The ligatures are left long enough to be brought out at the vaginal orifice, and a drainage tube is placed in the cervical canal.

Another method is to constrict the uterus with an elastic cord which is left on for two days; this diminishes the hæmorrhage on amputation. It is then cut loose, and the galvano-caustic wire or ecraseur applied in the track of the ligature.

Spencer Wells transfixed the uterus with needles, placed an elastic ligature above them, and amputated below them with Paquelin's cautery.

The old method of strangulation by ligature, with clipping away of the uterus as it sloughed off, should never be practised.

Re-inversion of the stump is a serious accident, as the raw surface now lies in the peritoneal cavity and may be a source of septicœmia; further, it is beyond our control should hæmorrhage occur. In two cases of amputation with the galvano-caustic wire, performed by Spiegelberg,* this accident occurred: in these cases no bad result followed, because the discharge escaped by the cervical canal; he attributes this happy result to the fact that the stump-surface of the galvano-caustic wire, being a convex cone, became, on re-inversion, a concave cone opening into the cervical canal.

---

* Archiv. f. Gyn., Bd. IV., S. 358.

CHAPTER XXXIII.

FIBROID TUMOURS OF THE UTERUS: PATHOLOGY AND ETIOLOGY.

LITERATURE.

Barnes—Op. cit., p. 746. *Duncan, Matthews*—Edin. Med. Jour.; Jan. and Feb. 1867. *Gusserow*—Die Neubildungen des Uterus: Stuttgart, 1878. *Klob*—Op. cit., S. 149. *M'Clintock*—Diseases of Women: Dublin, 1863. *Routh*—Fibrous Tumours of the Womb: London, 1864. *Schrœder*—Op. cit., S. 206. *Simpson, Sir J. Y.*—Op. cit., p. 659. *Thomas*—Op. cit., p. 519. *Winckel*—Ueber Myome des Uterus, &c.: Volkmann's Sammlung klin. Vorträge, No. 98, 1876.

SYNONYMS.—Myoma or Fibromyoma Uteri; Fibrous Tumour; Tumeur fibreuse; Hystérome.

As this tumour is composed of both the connective-tissue and muscular elements of the wall of the uterus, it is at once a fibroma and a myoma; the most correct term therefore is *fibro-myoma.* In the majority of cases, however, the fibrous tissue preponderates, so that the tumour resembles a fibroma; the English term fibroid (a term derived from the root of fibroma and εἶδος = like a fibrous tumour) is therefore not inappropriate, and is also more convenient.

PATHOLOGY.

Under this head we shall describe their—

Situation;
Structure—naked-eye and microscopic;
Mode of growth, varieties;
Changes in uterus;
Degenerative changes.

SITUATION.

They occur much more frequently in the body of the uterus than in the cervix; of seventy-four cases of fibroid tumours recorded by Lee, only four were in the cervix. In the body of the uterus the most common seat is *the posterior wall;* they occur less frequently in the anterior wall, and very rarely at the sides of the uterus. The soft, truly muscular, form is most commonly situated at the fundus.

STRUCTURE.

They are composed of the same elements as the muscular wall of the uterus, viz., of non-striped muscular fibre and fibrous tissue. These are both present in every case, hence the correct name for these tumours is fibro-myoma. The proportion of these constituents, however, varies; in some rare cases the muscular tissue preponderates, producing a true *myoma* which is not circumscribed and grows rapidly; more usually there is excess of fibrous tissue producing a *fibro-myoma*, which is distinctly marked off from the wall of the uterus and grows slowly. The naked-eye characters of the myoma are those of a flesh-coloured tumour having a soft consistence, passing gradually into the surrounding uterine wall, and usually single. The fibro-myoma, by far the most frequent form, is of firm consistence which makes it feel like a foreign body in the softer muscular wall; it is of a pale colour, resembling fibrous tissue; it cuts like cartilage, the cut surface having a glistening satinlike appearance and being often uneven through the firmer fibrous tissue forcing out the

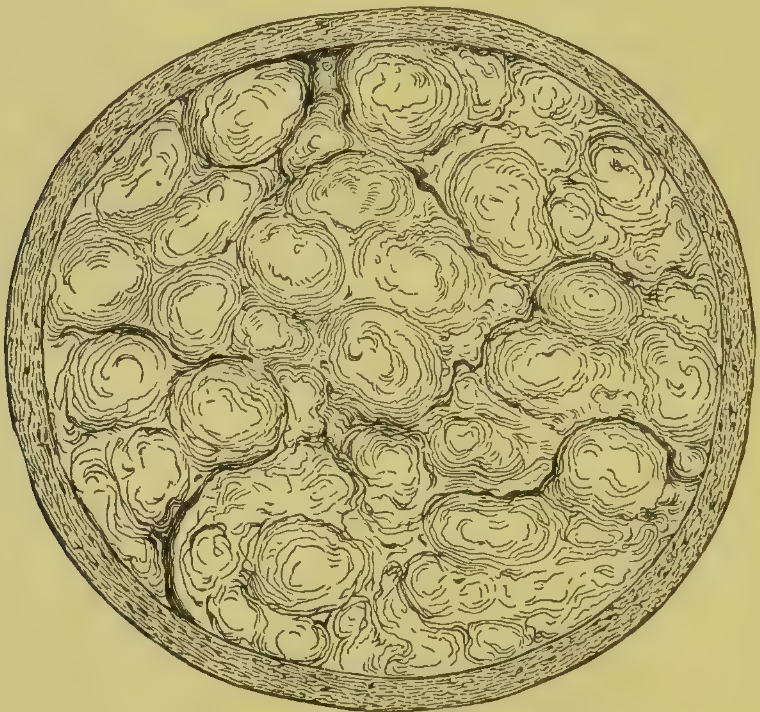


Fig. 236.

Section of a large fibroid tumour, with the fibres arranged round several centres (Sir J. Y. Simpson).

softer parts between; the bundles of fibrous tissue have a concentric arrangement round one or more centres (fig. 236). The tumour is surrounded by loose fibrous tissue, which with the immediately adjoining muscular layer constitutes the so-called *capsule*; it has a broad connection at one point with the muscular tissue of the wall, or becoming entirely detached from it lies free in its capsule. This looseness of the tissue round the tumour is important in relation to its removal by the process described as *enucleation.* Few bloodvessels penetrate into the substance of the tumour, although the tissue immediately round it is very vascular and often contains enlarged veins which resemble the venous sinuses of the pregnant uterus (fig. 246); nutrition is apparently effected by transudation from the capsule. In some rare cases, however, these tumours possess a cavernous structure consisting of dilated bloodvessels. Virchow has described this form as "Myoma teleangiectodes seu cavernosum;" cases are recorded by Leopold and Schrœder.

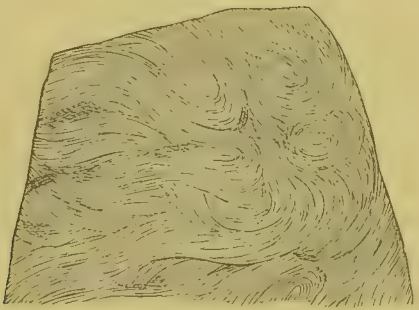


Fig. 237.

Section of fibroid tumour, showing wavy bundles of fibrous tissue $\frac{1}{1}$ (Gusserow).

On microscopic examination, the myomatous form has the appearance of muscular fibre of the uterus. The fibromatous form (common fibroid tumour) has the appearance shown at fig. 237, in which the wavy bundles of fibrous tissue are well seen. Sometimes the bundles of fibrous tissue are separated by spaces (fig. 238), which Klebs considers

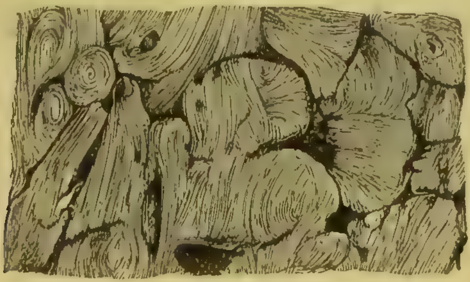


Fig. 238.

Section of fibroid tumour, showing spaces between bundles of fibrous tissue $\frac{1}{1}$ (Gusserow).

to be lymphatic spaces. Nerves have been traced into the substance of these tumours by Lorey; but, as an interesting case recorded by Freund shows, they are not sensitive—a sub-mucous fibroid was extruded beyond the vulva; the lower third, which protruded beyond its capsule of mucous membrane, was not sensitive to the prick of a needle; the upper two-thirds, from their being still covered by *mucous membrane*, were very sensitive.

MODE OF GROWTH, VARIETIES.

All fibroid tumours are, in the beginning, interstitial or intra-mural. As they increase in size they expand in the substance of the wall or towards one of the free surfaces (peritoneal or mucous), thus becoming subperitoneal or submucous. Hence three varieties are recognised—*interstitial*, *subperitoneal*, and *submucous*. It is evident that these terms are relative, as it is difficult to say when an interstitial fibroid becomes submucous. Gusserow limits the term "submucous" to *pediculated* submucous, and "subperitoneal" to *pediculated* subperitoneal fibroids. A submucous tumour, however, often gives rise to the clinical signs diagnostic of the submucous variety long before it becomes pediculated. Each variety requires short description. For the sake of convenience, we describe the fibroid tumours found in the body of the uterus; the comparatively rare fibroid tumours of the cervix are best noticed separately (p. 382).

A. The Sub-peritoneal grow outwards into the peritoneal cavity. The thickness of the pedicle varies (compare fig. 239 with fig. 240); its length determines the mobility of the tumour. When the tumour attains a certain size, one of two things happens. (1.) It may grow up into the abdomen and expanding there draw the uterus forcibly

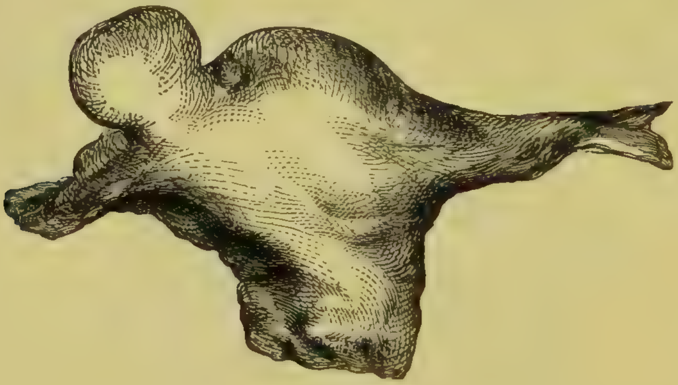


Fig. 239.

Pediculated Sub-peritoneal fibrous tumour (Sir J. Y. Simpson).

upwards, producing by this traction elongation of the cavity (fig. 240) with thinning of the walls. An interesting case is recorded by Times* in which the cavity of the body of the uterus was elongated to six inches; the cervical canal extending only one inch inwards from the os externum, ended blindly at a point two inches distant from the beginning of the cavity of the body; the intervening portion was obliterated so as to form a solid muscular cord. Virchow says that the body may even be torn from the cervix by forcible traction. (2.) The tumour, growing from the first within the pelvis, may through pressure produce the symptoms of incarceration; or, having a long pedicle, may fall down from the abdomen into the pelvis and produce similar symptoms. The point of origin of the tumour and the length of the pedicle determine whether these symptoms can be relieved by pushing the tumour out of

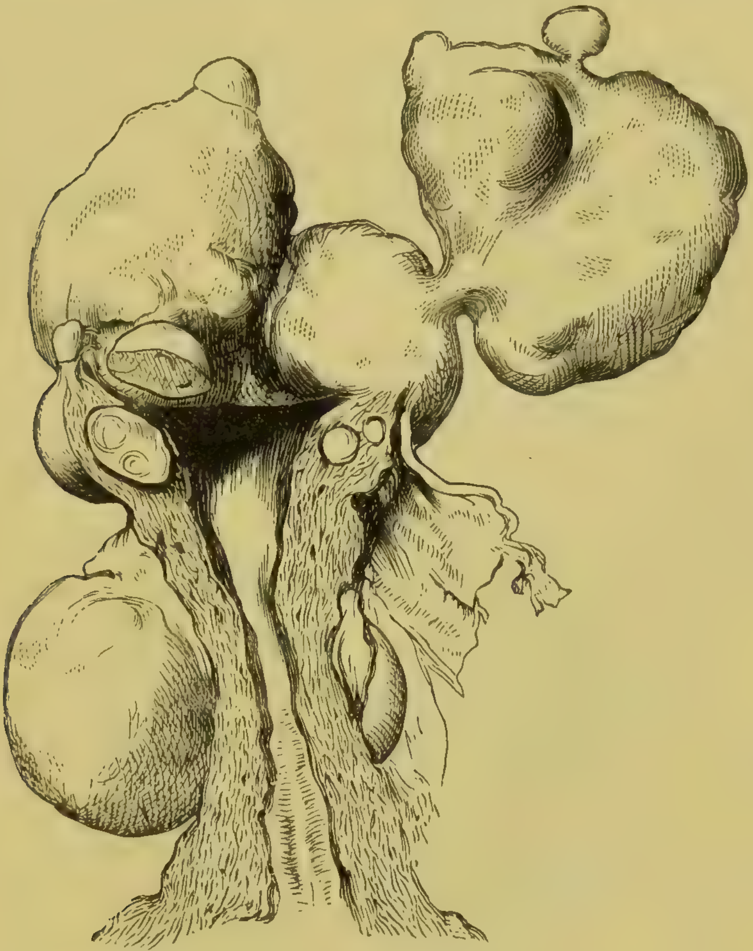


Fig. 240.

Uterus with elongated cavity due to the presence of several fibroid tumours (Sir J. Y. Simpson).

---

* Lond. Obst. Trans., vol. ii., p. 34.

the pelvis. Twisting of the pedicle occurs less frequently in fibroid than in ovarian tumours; when it occurs, it leads to œdema or gangrene. Schrœder* mentions a case where, on operating, he found the tumour distended with blood from partial twisting of the pedicle. Gangrene of the tumour, leading to a fatal peritonitis, was observed by Cappie;† the pedicle was twisted round its axis one and a half times. Adhesions form with other organs, as occurs with all abdominal tumours; these may become new sources of nutrition. Sometimes they lead to detachment of the tumour from the uterus: the tumour is anchored, as it were, to the abdominal walls; and, when the uterus from pregnancy or other causes becomes displaced, the pedicle gives way. Turner‡ reports a case in which a small calcareous fibroid was found free in the pouch of Douglas; a second was attached to the posterior wall of the bladder and to the pelvis; a third was bound down to the bladder and the pelvic wall by adhesions, but still retained its connection with the uterus by a thin pedicle. Adhesions to the intestines have produced symptoms of intestinal obstruction.§ Hernial protrusion of the abdominal walls has been described by Düll:|| he reports two cases of this very rare occur-

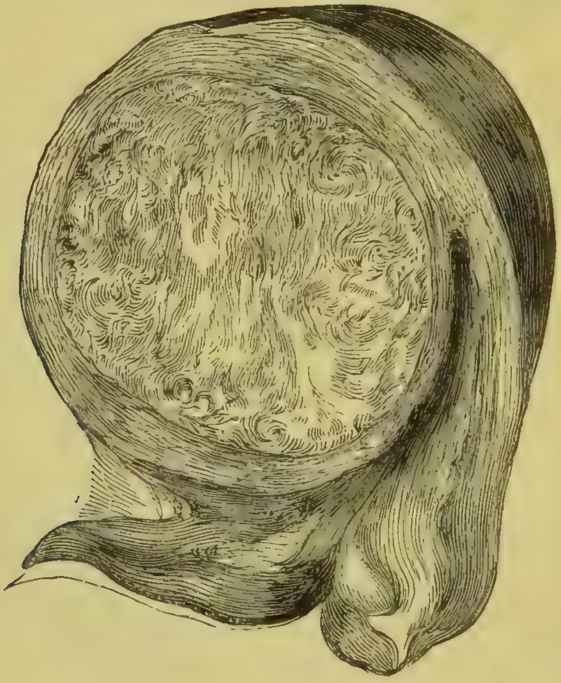


Fig. 241.

Interstitial Fibroid Tumour (Sir J. Y. Simpson).

---

* Op. cit., S. 218.
† Obstet. Journ., ii., p. 303.
‡ Edin. Med. Journ., 1861, p. 698.
§ Eade—Lancet, Dec. 21, 1872.
|| Cited by Schrœder, op. cit., S. 221.

rence; in one case, the skin covering the hernial sac became gangrenous, so that the tumour lay exposed.

B. *The Interstitial* remain in the substance of the uterine wall, and do not become pediculated. The appearance of such a tumour is well seen at fig. 241. Usually there are many such tumours present (fig. 240); Schultze counted as many as fifty in one uterus, and Thomas describes the uterus of a negress containing thirty-five.

C. *The Submucous* are the most important clinically. They lie immediately underneath the uterine mucous membrane, and project into the cavity of the uterus (fig. 242). They are attached along a broad base, or by a pedicle; when they hang free, they are known as fibrous polypi (the most frequent form of uterine polypi, to be described in a separate chapter). When a fibroid tumour projects into the uterine cavity, it acts as a foreign body and produces uterine contractions. These lead, in some instances, to *pedunculation* of the tumour and even to its extrusion from the uterine cavity; in such a case, it hangs as a polypus into the vagina. In other rare cases, the capsule ruptures and the liberated tumour is expelled piecemeal—*spontaneous enucleation.*

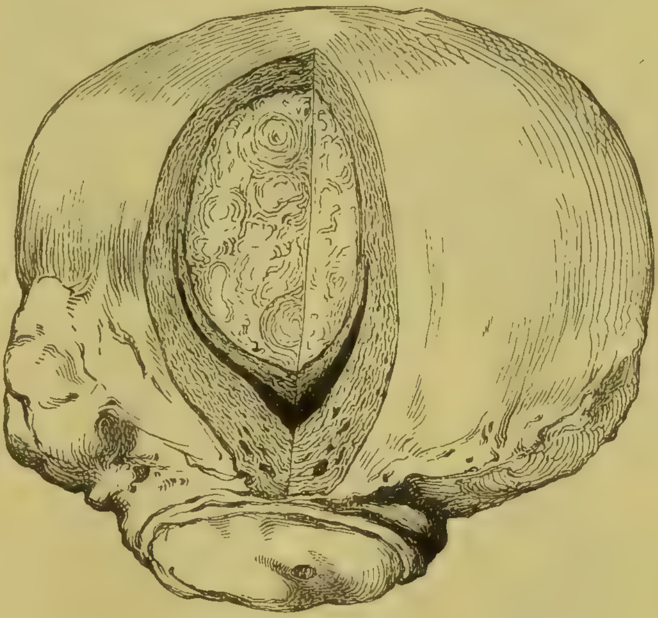


Fig. 242.

Submucous Fibroid Tumour projecting into uterine cavity (Sir J. Y. Simpson).

CHANGES IN THE UTERUS.

The *muscular wall* hypertrophies, more especially when the tumour is submucous or interstitial. A small fibroid lying in the lower segment of the uterus has caused the whole organ to hypertrophy to the size of a child's head.* In submucous fibroid, the *mucous membrane* is also hypertrophied; over the surface of the tumour, it may form adhesions or may ulcerate. The changes in the structure of the uterus generally, thus

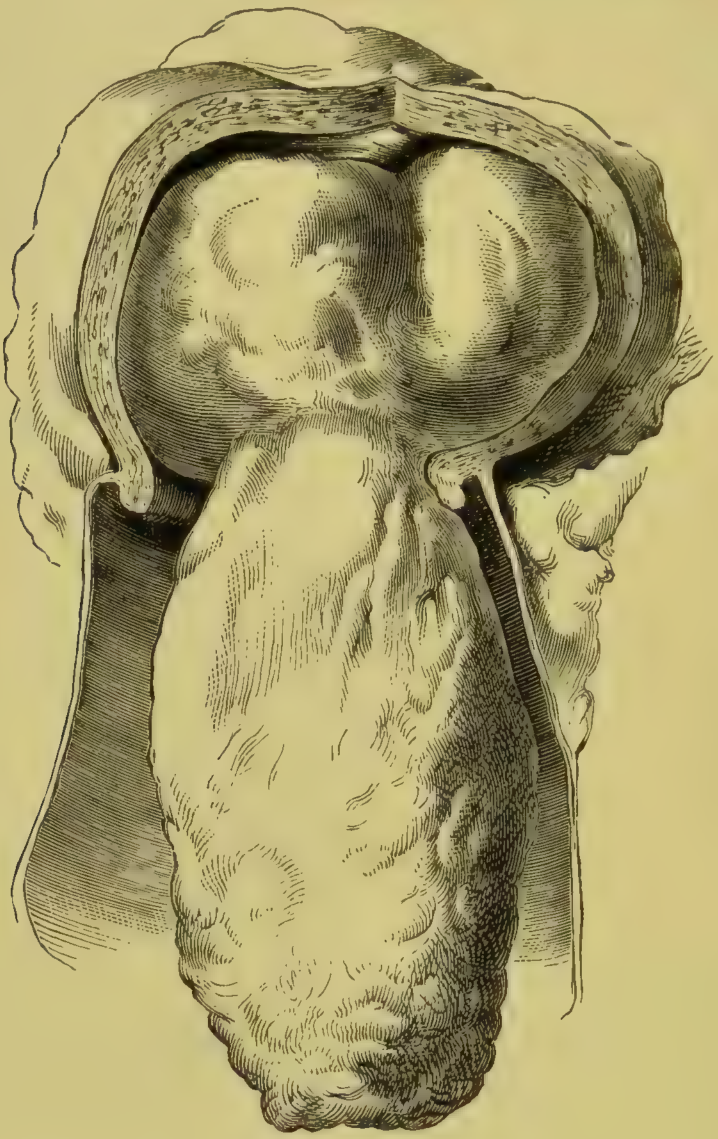


Fig. 243

Pediculated Submucous Fibroid in process of extrusion (Sir J. Y Simpson).

resemble those of pregnancy and have been described by French writers as "Une grossesse fibreuse." *Changes in the position* of the uterus have been already referred to; when subperitoneal fibroids rise up into the abdomen, it is sometimes drawn forcibly upwards by them and may be twisted on itself.* At other times the weight of a subperitoneal or interstitial tumour leads to prolapsus uteri. Inversion of the uterus is also occasioned by submucous fibroids when these are situated near the fundus and when their pedicle does not admit of extrusion as polypi.

---

* Tillaux—Gaz. des Hôp, 1867, No. 144.

DEGENERATIVE CHANGES.

These are the following:—

Softening,
Induration,
Calcification,
Suppuration.

The softening may be due to œdema, to fatty degeneration, or to myxomatous degeneration. The occurrence of the œdema is unquestioned, and many cases of sudden increase in the size of fibroid tumours may be thus explained. From analogy with the changes affecting muscular fibre in the puerperal uterus, we should expect fatty degeneration to occur; there is, however, only a small quantity of muscular tissue present in these tumours. There are only two cases† recorded in which the existence of fatty degeneration has been demonstrated by microscopic examination, although many cases are reported in which this is supposed to have occurred. Myxomatous degeneration, resulting in the formation of spaces containing mucus between the layers of the tumour, sometimes occurs.

Induration, with atrophy or shrinking of the tumour, occurs in some cases after the menopause. The muscular tissue fattily degenerates and disappears, the fibrous tissue contracts.‡

When calcification occurs, lime salts (chiefly phosphates) are deposited in the fibrous tissue and produce the so-called womb-stones. This deposit usually commences in the centre of the tumour and extends outwards, more rarely in the external layers so as to form a shell round the tumour. Sometimes it is so extensive that the tumour can be cut with the saw, and the cut surface polished; more usually it is incomplete, and forms a coral-like skeleton. Calcification affects only subperitoneal and interstitial fibroids. Calcification of portions of the tumour is often accompanied with suppuration in others, probably from interference with nutrition.

---

* As in the case reported by Küster—Beiträge zur Geb. u. Gyn, 1872, Bd. i., S. 7. The uterus was twisted two and a half times, so that the broad ligaments formed a spiral.

† Gusserow—Loc. cit., S. 31. The cases are reported by Freund and Martin.

‡ Sir J. Y. Simpson—Obst. Mem., p. 115.

Suppuration occurs frequently in submucous fibroids, as the result of injury from operative interference or from constriction of its pedicle during the process of expulsion. It has also been observed as a rare occurrence in subperitoneal fibroids, accompanying calcification or from torsion of the pedicle. In such a case, the tumour either finds its way through the abdominal walls or fatal peritonitis follows.

Whether *carcinomatous* degeneration specially affects fibroid tumours, is a disputed point. We occasionally find carcinomatous degeneration in a uterus where a fibroid tumour is also present (fig. 273) or from which a polypus has on a former occasion been removed. Whether this is merely a coincidence, or whether there is a liability that the non-malignant tumour may become the seat of malignant disease, is not settled. The practical importance of this question is evident.

FIBROID TUMOURS OF THE CERVIX,

The occurrence of fibroid tumours in the cervix is rare; but, when they are present, they often give rise to difficulty in diagnosis on account of the distortion which they produce. They spring from either wall, and grow outwards towards the peritoneal cavity or downwards into the cellular tissue beside the vagina. When sub-serous, they easily produce symptoms of incarceration, as, from their low position, they are liable to become wedged in the pelvis. When submucous, they produce elongation of one lip and may form a polypoidal tumour

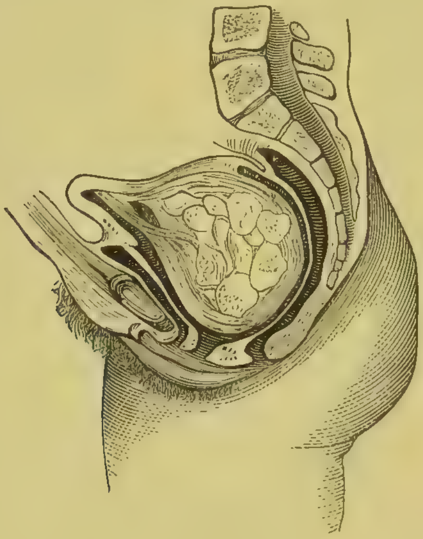


Fig. 244.

Cervical polypus springing by a fibrous pedicle from the region of the os internum, and pushing itself under the whole mucous membrane of the cervical canal; so that its insertion is partly continuous with the tissue of the uterus, partly truly submucous. Between these a cavity has formed, through tearing of the mucous membrane, so that the tumour has apparently two pedicles (Schrœder).

in the vagina (fig. 244); the accompanying distortion of the os externum leads to difficulty in diagnosis. Cases in which a large tumour bulges through the ostium vaginæ have been mistaken for inversion and prolapsus. Sometimes, prolapsus is due to the weight of the tumour and disappears after its removal.* The interstitial form is easily mistaken for inversion when the os is converted into a transverse cleft which escapes observation and the unaffected lip is thinned out to a mere band.

ETIOLOGY.

Gusserow, to whose exhaustive article—Die Neubildungen des Uterus—in Billroth's Handbuch we are greatly indebted in this chapter, says in regard to etiology, "Ueber die Ursachen der Uterusmyome wissen wir so wenig, wie über die Ursachen der meisten pathologischen Neubildungen, nämlich *nichts*" (of the causes of fibroid tumours we know as little as of the causes of most pathological new-formations, that is *nothing*). Virchow and Winckel have both made elaborate attempts to assign a cause to the development of fibroid tumours. The number and variety of causes adduced by these observers only show how far we are from the knowledge of the real cause; with such a variety of causes, the difficulty would not be to explain why they are present in some but why they are not present in every case.

They are without doubt the most frequent new formation in the uterus. Klob says that they are present in 50 p.c. of women who die over fifty years of age; and Bayle, in 20 p.c. of those who die over thirty-five years; both of these estimates are probably beyond the mark.

Their development is in some way related to the development of the sexual apparatus. Thus, there are no well-authenticated cases of their arising before puberty or after the menopause. The majority of patients are between the ages of thirty and forty when they first seek medical advice, as is evident from the accompanying table based on statistics collected by Gusserow (fig. 245). Schrœder says that of 196 patients, who during three years of his private practice consulted him for fibroid tumours, 104 were between forty and fifty and 62 between thirty and forty.

Sexual activity predisposes to their development as they are almost twice as frequent in married as in unmarried women; of 959 cases collected by Gusserow, 672 were married women. It is important to note this as it was formerly supposed that single life favoured their development. As the presence of a fibroid tumour interferes with conception, we often find sterility present.

---

* Barnes—Obst. Trans., III., p. 211.

TABLE AND DIAGRAM SHOWING FREQUENCY OF FIBROID TUMOURS ACCORDING TO AGE OF PATIENT.

NUMBER OF CASES.

Out of 919 cases
15 were below 20 years.
156 ,, between 20 and 30 years.
357 ,, ,, 30 ,, 40 ,,
338 ,, ,, 40 ,, 50 ,,
36 ,, ,, 50 ,, 60 ,,
12 ,, ,, 60 ,, 70 ,,
5 ,, above 70 ,,
(Gusserow).

PERCENTAGE PROPORTION.

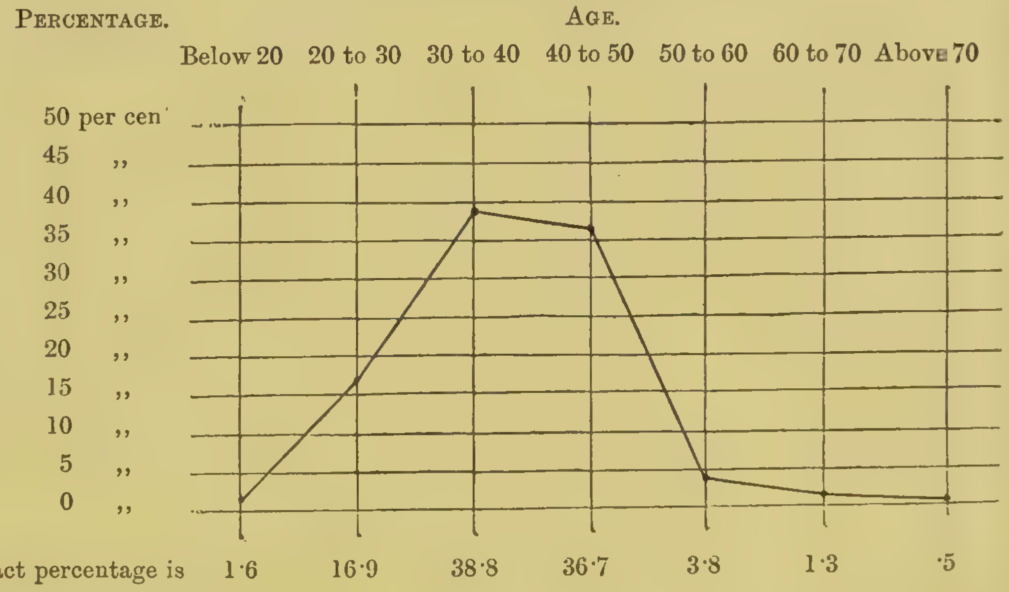


Fig. 245.

CHAPTER XXXIV.

FIBROID TUMOURS OF THE UTERUS: SYMPTOMS; DIAGNOSIS; PROGNOSIS.

LITERATURE.—See Literature of Chaps. XXXIII. and XXXV.

LIKE other pathological conditions of the uterus, fibroid tumours sometimes produce no symptoms and their presence is discovered accidentally or on *post-mortem* examination. This absence of symptoms is more likely to occur should the tumour be small, or should there be no sexual activity as in unmarried women. In the latter case, although symptoms appear only when the patient enters married life, the tumour may have been already a long time present. Subperitoneal tumours, even when large, may only produce discomfort from undue abdominal distention.

The symptoms usually present may be tabulated as follows :—

1. Menorrhagia, irregular hæmorrhages ;
2. Painful menstruation ;
3. Pelvic sensations due to size and weight of tumour, peritonitic pain ;
4. Symptoms of pressure on bladder and rectum,
   bloodvessels and nerves,
   ureters ;
5. Sterility and abortion.

1. *Hæmorrhage* is the most characteristic symptom in submucous fibroids, and appears first as a *gradual increase* of the normal menstrual flow ; it never begins with a sudden flooding, as in carcinoma uteri. In *menorrhagia*, the hæmorrhage comes from the hypertrophied mucous membrane of the uterine cavity generally ; it does not come from the mucous membrane covering the surface of the tumour which is frequently thinned and atrophied, nor from the substance of the tumour itself which as we have seen is sparingly vascular. When, however, the submucous fibroid projects as a polypus, passive congestion and

hæmorrhage from the mucous membrane covering it may be occasioned by the constriction of its pedicle. *Irregular hæmorrhages* arise from ulceration of the mucous membrane covering the tumour, or rupture of the dilated veins in its capsule. Fig. 246 shows a case* in which, through the rupture of a uterine sinus in the lower part of the tumour, a sudden and fatal hæmorrhage occurred. In subperitoneal fibroids menstruation is not increased, and in certain rare cases is diminished.

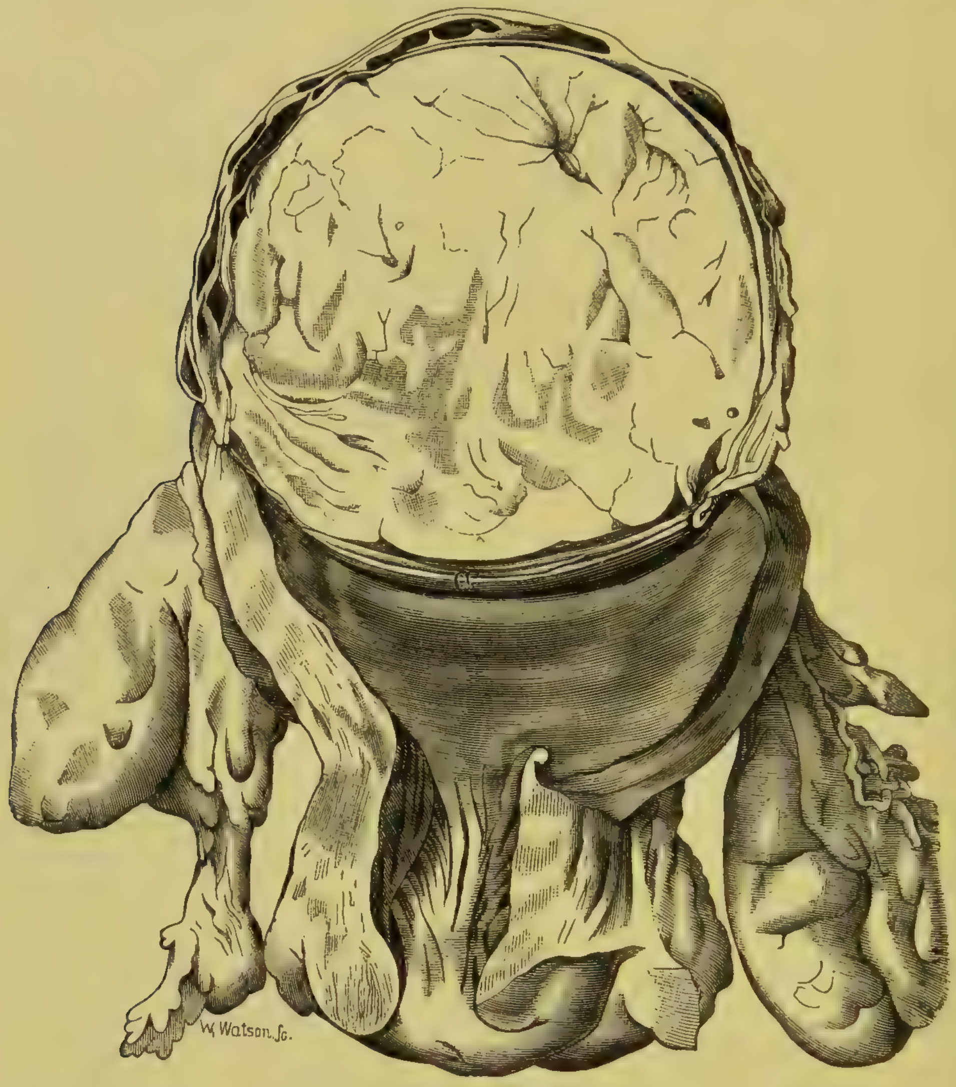


Fig. 246.

Uterus containing Fibroid Tumour, from a case which terminated fatally through hæmorrhage. Note the large venous sinuses in the capsule, one of which ruptured at the point *a* (Matthews Duncan).

2. *Pain* accompanies *menstruation*. In the submucous variety

---

[*] Reported by Matthews Duncan—Edin. Med. Jour., 1867, p. 634. He also refers to a case of Cruveilhier's in which death was occasioned in the same way.

there is often characteristic uterine *dysmenorrhœa*, in which the pain resembles labour pains. The congestion causes the polypus to swell, and this produces uterine contractions (*v.* Uterine Polypi). In interstitial and even in subserous fibroids, there is often pain at the menstrual period which cannot be thus explained. In subserous fibroids with a pedicle containing large vessels, as well as in interstitial, Gusserow ascribes the pain to the distention of the tumour with blood. This pain is of a stretching or dragging nature, and is quite different from the pain of uterine contractions.

3. *Increased weight* of the uterus occasions *sensations* of discomfort, which are described as "fulness or weight in the pelvis," "a sensation of dragging," "bearing down pain." When the tumour is so large that it fills the pelvis and becomes wedged in it, intense pain is produced; this is either always present, or recurs only at the menstrual periods when the tumour is distended by blood. As in carcinoma uteri, peritonitic pains—indicated by local tenderness and reflex contraction of abdominal muscles—may arise at any time from secondary chronic peritonitis. Neuralgic pain is sometimes present locally (see below), but may be also through the whole body.

4. Frequency of micturition, due to *pressure on the bladder*, is the most common pressure symptom. *Pressure on the urethra* produces difficulty of micturition and even retention; with some patients, this recurs regularly at the menstrual period. Even very small fibroids, when they are situated in the anterior uterine wall, may press *on the neck of the bladder* and produce symptoms of cystitis. *Pressure on the rectum* by fibroids in the posterior wall, occasions constipation or, more rarely, mucous diarrhœa. Incarcerated fibroids have produced complete obstruction, and led to a fatal result * or furnished an indication for colotomy. Intestinal obstruction has also resulted from adhesions between the tumour and the small intestine.† *Pressure on the veins* produces hæmorrhoids and varicose veins in the legs. Interesting cases of neuralgia due to pressure on *pelvic nerves* have been recorded. In these cases the neuralgia entirely disappeared as soon as the tumour was lifted up and supported by a pessary.‡ Compression of *the ureters*, with consequent dilatation and hydronephrosis, occurs less frequently in fibroid tumours than in carcinoma. The reason for this is evident; in carcinoma the compression is due to infiltration of the tissue round the ureter, which from the anatomical relation of the ureters to the

---

* Holdhouse—Lond. Path. Soc. Trans., III., 371.

† Eade—Lancet, Dec. 21, 1872.

‡ Kidd—Dub. Quart. Journ., 1872. Jude Hüe—Annales de Gyn., IV., p. 239

cervix easily occurs; fibroid tumours in their growth simply press against the ureters, and may push them aside. Several cases of single and double hydronephrosis and of death from uræmia,* have been recorded. Bright's disease has developed secondarily.† In fibroid tumours where pressure symptoms are present, we should always examine the urine.

5. *Sterility* is frequent. Of 149 cases of married women collected by Schrœder, 33 per cent were sterile and the average number of children to each mother was about three. When conception occurs, fibroid tumour may lead to abortion or complicate labour.

PROGRESS AND RESULTS.

A relative cure usually takes place at the menopause, when the tumour ceases to grow. In the case of subserous tumours, this may happen even before that time.

Spontaneous disappearance of the tumour has been observed in certain cases, although nothing definite is known as to the means by which it is effected. After sifting the reported cases, Gusserow's conclusion is that there are thirty cases in which this undoubtedly occurred.‡ Out of these thirty, thirteen were associated with the puerperium and the rest chiefly with the menopause. We might account for their disappearance during the puerperium by a process analogous to involution. Of the reason of the disappearance at the menopause we know nothing.

Complete cure also results from *spontaneous expulsion*. This occurs in three ways :—

(1.) By pediculation and extrusion of the tumour as a polypus (*v.* under Uterine Polypi);

(2.) By enucleation, in which the tumour is shelled *en masse* out of its bed;

(3.) By the breaking down of its substance and consequent expulsion in fragments.

Enucleation occurs in submucous and also in interstitial tumours. The mucous membrane of the capsule ulcerates, and the tumour is thus exposed; partly through suppuration, partly through uterine contractions, it becomes detached all along the line of its capsule and, being thus liberated, is expelled. This process is comparatively safe for the patient, though there is always the risk of hæmorrhage from the large veins in the capsule (fig. 246). In spontaneous enucleation, suppuration does not occur in the tumour itself but only in its capsule.

---

* Gusserow quotes cases from Jude Hüe, Murphy, Hanot—Neubildungen etc., S. 47.

† Hubert—Bull. de la Soc. anatom., 1873, p. 870.

‡ He does not refer to a case observed by A. R. Simpson, and probably others have been overlooked.

The *breaking down* of the substance of the tumour is a much more dangerous process for the patient. As it is a slow one, there is risk of absorption of septic matter. The commencement of this change is indicated by increase in the size of the tumour, which becomes tense and painful to the touch. There is a purulent fœtid discharge from the vagina, and sometimes hæmorrhage. The constitutional symptoms of loss of appetite and hectic fever afterwards develope, and most of such cases end fatally.

Expulsion of the tumour generally takes place per vaginam. As in other tumours we have inflammatory adhesions forming with neighbouring organs, followed by suppuration and perforation by the tumour. Thus calcified fibroids have perforated into the bladder, and have been mistaken for vesical calculi.* A fibroid has perforated into the rectum, and has been discharged per anum. In some cases adhesions with the abdominal wall have formed, and the tumour has been thus discharged.

Considering the frequency of fibroid tumours, it is rare that *death* follows immediately from their presence. A fatal result, however, may follow from (1) suppuration in the tumour, producing death from septicæmia, or a septic peritonitis; (2) uræmia, due to compression of the ureters; (3) direct hæmorrhage; (4) acute simple peritonitis.

PHYSICAL SIGNS: DIFFERENTIAL DIAGNOSIS.

The physical signs of fibroid tumours are usually so well marked that diagnosis is easy. In certain cases, however, diagnosis is very difficult; and when inflammation is superadded, certainty is impossible. Physical diagnosis is best considered under two heads: A. of small fibroid tumours, up to the size of a walnut or egg; B. of larger ones, which rise up as a distinct tumour unto the abdomen.

A. OF SMALL FIBROID TUMOURS.

1. Pediculated *submucous* fibroids should be easily recognised. When they are small and not projecting through the os, we have to dilate the cervix to ascertain their presence and attachment; when larger and projecting into the vagina, they may readily be mistaken for inversion of the uterus. On sweeping the finger round the base, we recognise the

---

* M'Clintock—Dub. Quart. Jour., Feb. 1868.

commencement of the cervical canal unless the polypus be adherent at its neck leading to obliteration of the canal (*v.* fig. 227). Further, the bimanual or rectal examination shows the fundus uteri to be in its normal position.

2. Small *interstitial* fibroids when situated *low down* and causing bulging of one lip of the cervix, give rise to difficulty; owing to the great enlargement of one lip, the os is displaced to the other side and its form altered to that cf a mere slit which easily escapes observation. Such cases have been occasionally mistaken, even by the most experienced, for inversion. This mistake is prevented by examination per rectum. Further, the sides and base of the tumour must be carefully scrutinised to discover the os; when this is found, the sound will show the position of the uterine cavity.

3. *Interstitial* fibroids placed *high up* in the uterus, or small *subserous* ones with a *broad base* of attachment, often escape detection. To ascertain their presence we proceed as follows. Pass the sound; this defines the course of the uterine canal and position of the fundus. Now make the bimanual examination with the sound, as represented in fig. 97; the finger in the anterior fornix detects the thickening of the anterior wall, produced by a small fibroid. Now steady the sound with the left hand, and pass the forefinger of the right hand into the rectum so as to feel the sound lying in the uterus. Should there be a fibroid in the posterior wall, the finger recognises an unusual thickness of tissue between it and the sound. Carry the sound, firmly grasped by the left hand, towards the symphysis, so as to bring the fundus better within reach of the rectal finger; and, by moving it from side to side, ascertain whether the tumour is intimately connected with the uterus so that it moves along with it. From their being largely composed of fibrous tissue, these tumours are firmer than the uterine wall; the *localised hardness*, therefore, helps us in recognising them.

Small fibroid tumours require to be diagnosed from

Chronic metritis,
Early pregnancy,
Ante- and retro- flexion.

In *chronic metritis* the uterus is not globular but flat, and the enlargement is equable; the uterine canal is patulous; the os is everted, and shows catarrhal patches. We must remember that chronic metritis is occasionally present along with a fibroid tumour.

In *early pregnancy*, the uterus is soft and elastic; the cervix is generally softened, while in fibroids it remains hard. Pregnancy, however, may occur in a uterus which is already the seat of a fibroid tumour (fig. 247); and in such a case the diagnosis becomes certain only after the uterus is considerably enlarged. The possibility of pregnancy must specially be kept in mind here, as we involuntarily think of using the sound to aid in detecting fibroids.

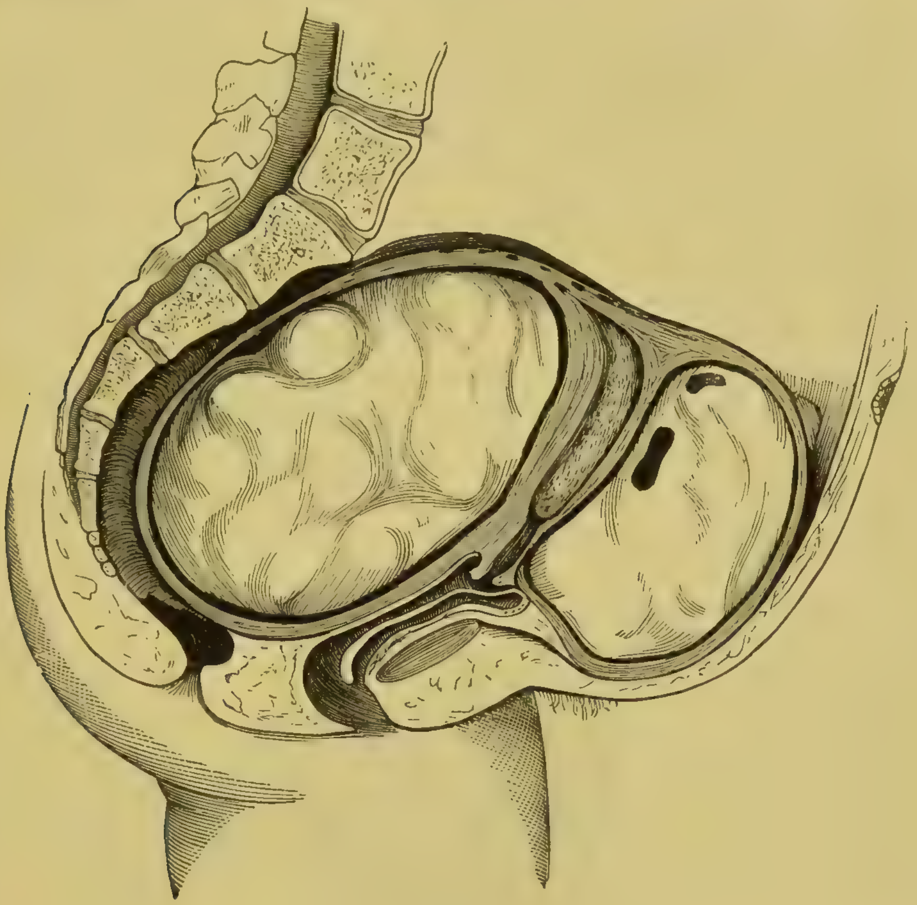


Fig. 247.

Case of two and-a-half month's pregnancy associated with two large fibroid tumours—one in the anterior, the other in the posterior wall. The uterus and tumours were removed by Laparotomy (Barnes).

Anteflexion is closely simulated by a fibroid in the anterior wall; a body is felt in the anterior fornix, continuous with it, but separated by a groove. Similarly, a fibroid in the posterior wall has all the characters of the *retroflexed fundus*. Examination by the sound (*v.* fig. 198), and especially by the sound plus the Bimanual, clears up the case.

B. OF LARGE FIBROID TUMOURS.

When the tumour extends into the abdomen, we proceed with the systematic examination as described at page 88.

Palpation. The tumour has a well defined outline, and a firm solid consistence. It is intimately connected with the uterus; this is best ascertained by laying hold of the cervix with the volsella, when the cervix will be found to move along with the abdominal tumour. Subserous fibroids have a certain range of free movement depending on the length of the pedicle. *Percussion.* The note is absolutely dull, unless intestines come between the tumour and the abdominal wall. *Auscultation.* The uterine souffle is heard most distinctly at the sides, sometimes all over the tumour. As the uterine souffle simply means enlarged uterine arteries, there is no souffle when these are not enlarged; hence it is absent in subserous fibroids with a small pedicle. *Vaginal examination.* Should the tumour be large and lifting the uterus into the abdomen, the cervix will be high up; or it may be displaced in various ways, according to the position of the tumour; it has a firm consistence. *Bimanual.* With pediculated subserous fibroids, the uterus is felt distinct from the tumour; with interstitial and submucous, we simply feel a large mass continuous with the cervix. *The Sound.* This should not be used till all possibility of pregnancy has been excluded. In doubtful cases, we wait three or four months till the positive signs indicative of pregnancy should have had time to develope. From the use of the sound we learn (1) the length, (2) the

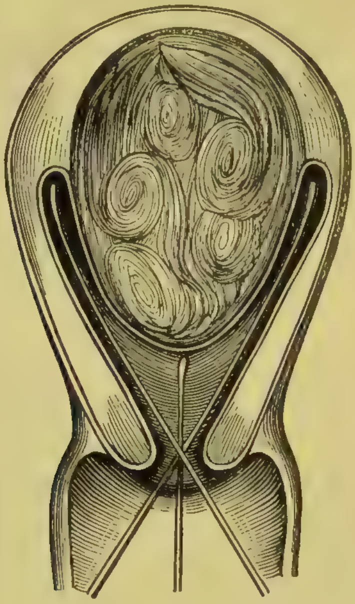


Fig. 248.

Sound used to detect pediculated submucous fibroid (Leblond).

direction of the uterine cavity. The length of the cavity is always increased in submucous, and generally in interstitial, but not in subserous tumours; it may measure six or eight inches. The direction of the canal is often tortuous in submucous; hence the passage of the sound is difficult, sometimes impossible. We feel that the sound goes so far and then catches on a hard projection. In such cases, a soft (No. 8) bougie is very useful, as its flexibility allows it to pass the obstruction. Usually, the sound passes to only one side of the tumour; sometimes we can sweep it more or less round the tumour, showing that it projects free into the uterine cavity (fig. 248).

Large fibroid tumours require to be diagnosed from—

Advanced pregnancy,
Ovarian tumours;

Extra-uterine gestation,
Haematocele and inflammatory deposits.

In *advanced pregnancy* the uterus is of softer consistence, and shows ballottement—the indication of a solid within a fluid; further, we can feel the parts of the fœtus. It becomes occasionally harder under the hand, specially if we make the patient change her position; this *variation in consistence* is a most valuable diagnostic, as it is rarely present in fibroid tumours. We hear the uterine souffle and, unless the child be dead, we hear in addition the *fœtal heart;* the possibility of the child's being dead should always be kept in mind. On vaginal examination, there is discoloration of the vaginal walls with free secretion; the cervix is softened. There is usually amenorrhœa corresponding in duration to the size of the uterus.

Ovarian tumours are soft and elastic; small ones may be firm. There is no uterine souffle. They only give rise to difficulty in diagnosis when they have become adherent to the uterus, and move along with it. It is sometimes impossible to diagnose between them and cystic fibroid tumours (*v.* Fibro-cystic Tumours).

Extra-uterine gestation presents great difficulty in diagnosis, but we delay its consideration till the chapter on that subject (*v.* Section IX).

In *haematocele and inflammatory deposits* we have the history of the attack to guide us. It may be impossible to form a diagnosis on first examination; but after watching the case for a few weeks and noting any change in the deposit in addition to ascertaining its precise situation, we can form a diagnosis. Pelvic peritonitis frequently occurs round a superitoneal fibroid, or any fibroid producing pressure; and in such a case it is impossible to diagnose between the tumour and the effusion round it. Many cases reported of gradual absorption of a fibroid tumour under treatment, were probably cases of mistaken inflammatory exudation.

PROGNOSIS.

In forming our prognosis we must take into account (1) the site of the tumour in the uterus, most favourable when subserous; (2) its position in the pelvis, whether low down and likely to become wedged within it; (3) the symptoms already present, of which hæmorrhage is the most important. Though (as already said) they are rarely dangerous to life, they may cause the patient many years of suffering from which she only finds relief at the menopause.

CHAPTER XXXV.

FIBROID TUMOURS OF THE UTERUS: TREATMENT.

LITERATURE.

Atlee—The treatment of fibroid tumours of the uterus: Internat. Med. Cong. Trans., Sept. 1876. *Duncan, Matthews*—Clinical Lectures: London, 1879, p. 158. *Greenhalgh*—On the use of the actual cautery in the enucleation of fibroid tumours of the uterus: London Med. Chirurg. Trans., Vol. LIX. *Hegar u. Kaltenbach*—Die operative Gynäkologie: Stuttgart, 1881, S. 416. *Leblond*—Traité élémentaire de Chirurgie gynécologique: Paris, 1878. *Palmer*—Laparotomy and Laparo-Hysterotomy, their indications for fibroid tumours of the uterus: Americ. Gyn. Trans., 1880, p. 361. *Simpson, A. R.*—The treatment of fibroid tumours of the uterus; Contributions to Obstetrics and Gynecology, Edinburgh, 1880. *Sims, Marion*—On intra-uterine fibroids: New York Medical Journal, April 1874. *Wells, Spencer*—Brit. Med. Journ., May and Dec. 1878. See also references in the text.

THIS is best considered under the heads of medical and surgical treatment.

A. MEDICAL TREATMENT.

There is no medicine which acts immediately upon fibroid tumours so as to cause disintegration and absorption. We have, however, a very important remedy in *ergot of rye;* the beneficial effects of this have been brought forward by Hildebrandt,* and by A. R. Simpson whose paper on the treatment of fibroids may be consulted for illustrative cases. It acts beneficially in two ways—by checking their nutrition through diminishing the amount of blood circulating to them, and by favouring their pedunculation and expulsion; these are both due to its action on the unstriped muscular fibre of the walls of the uterus and coats of the bloodvessels. Success in its use depends, according to Simpson, on securing that the preparation of ergot used be active, that it be properly administered, and that the case be a suitable one. The formula for the preparation which he recommends is—

℞	Ergotinæ	ʒii.	
	Aquae	℥vi.	
	Chloral-hydratis	ʒss.	M.

---

* Berlin. klin. Wochenschrift, 1872, No. 25.

Three grains of ergotin are contained in twelve minims of the fluid, which is a good medium dose. Chloral is added to make the solution keep; but even with this it becomes after some weeks unfit for use, and should therefore be made up repeatedly and in small quantities. It is administered with the ordinary hypodermic needle. Care must be taken that the syringe contains no air; this is best secured by holding it with the needle upwards and squirting out some of the liquid. The injection is made in the gluteal region, which is readily done when the patient is lying on her side; and on the right and left sides alternately, so as to diminish the frequency of punctures in the same region. Enter the needle vertically and plunge it rapidly *deep into the muscle*, the point entering to the depth of from an inch to an inch and a-half; now empty the syringe, and quickly withdraw the needle. After use, remember to cleanse the needle with water and to replace the wire in it. The patient soon becomes accustomed to the prick of the needle and, if it be entered deeply into the muscle, there is little fear of local suppuration; after three years' experience we have seen this in but one case, and this was probably due to a bad preparation of the solution. For the first few weeks the injections may be made twice a-week, afterwards only once a-week. The treatment is continued for several months until its effect is seen in diminution of the size of the tumour or, at least, of the hæmorrhage from it. The suitable cases are those in which the tumour is intra-mural or submucous; "it must be surrounded by layers of muscular fibre, sufficiently developed to be capable of being excited to contraction."

When the patient cannot be seen frequently by a physician, a friend or a nurse should be instructed how to apply the needle. Ergot can also be administered in the form of pill, suppository (4 gr. in each) or liquid extract (30 drops thrice daily). When given by the mouth, however, it does not act so quickly or surely as when given hypodermically.

Bromide of potassium was recommended by Sir J. Y. Simpson, who believed that it had a marked influence in checking the growth and even in reducing the size of fibroid tumours. It is impossible to say whether, in cases where the tumour diminished in size during its administration, this result was due to the bromide. As a prolonged use of the bromide is generally necessary, small doses (ten grains, three times a-day) should be administered. Being a nervine sedative, it is useful to give it in cases where the only symptoms are discomfort from the presence of the tumour or neuralgic pain. Should the tumour be increasing in size, or should there be much hæmorrhage, we must have recourse to ergot.

When the patient can afford it, benefit is undoubtedly derived from a course of treatment of *mineral waters* (such as those of Kreuznach) as recommended for chronic metritis.

The symptoms due to the weight of the tumour may be relieved by *artificial support.* Thus patients with a small fibroid often derive great benefit from wearing a Hodge pessary; the discomfort of a large abdominal tumour is materially lessened by wearing a broad flannel bandage.

When the tumour nearly fills the pelvis and is beginning to press injuriously upon the bladder and rectum, we should, when possible, *push it up out of the pelvis* into the abdomen; this is done before the occurrence of pelvic peritonitis, which may hopelessly bind it within the pelvis. The most favourable case for this manipulation is a subserous fibroid with a distinct pedicle.

B. SURGICAL TREATMENT.

This consists in the removal of the whole tumour or portions of it through the vagina, or through the abdominal walls.

a. REMOVAL THROUGH THE VAGINA.

We have seen that this process takes place *spontaneously*, either by pedunculation and extrusion as a polypus or by enucleation. In *operating*, we simply favour these natural processes. The former will be described under "Treatment of Polypi" (see next chapter).

We favour enucleation of the tumour (1) by dilating or dividing the cervix uteri; (2) by incision of the mucous membrane covering the surface of the fibroid; (3) by stimulating the uterus to contract and expel it spontaneously from its bed, or by laying hold of and forcibly detaching it. These might be considered either as different consecutive operations, or as successive steps in the same operation.*

The *dilatation of the cervix* is effected by sponge tents or a bilateral incision with the scissors; incision with the thermo-cautery, as practised by Thomas, reduces the risk of hæmorrhage and septic infection. Sometimes this is all that is required. After the division of the cervix, the hæmorrhage (which is usually the indication of the operation) ceases; if the tumour is in the process of expulsion, this takes place more readily through the dilated cervix. Even diminution of the size has been observed after the operation, though there is no explanation of how this occurs.

---

* Matthews Duncan—Edin. Med. Jour., Feb. 1867.

Should this operation be insufficient, we proceed next to *incision of the mucous membrane covering the tumour.* The purpose is twofold. (1.) It checks hæmorrhage. We have referred to the existence of venous sinuses in the capsule of the tumour, from which profuse hæmorrhage sometimes occurs (*v.* fig. 246) ; when these are cut through, they retract and are closed by thrombi. After this operation the hæmorrhages are, for a long period at least, checked. (2.) It favours spontaneous enucleation of the tumour, which comes to protrude through the incised mucous membrane.

The mucous membrane is incised either with the bistoury or with the thermo-cautery as follows. Carry a probe-pointed bistoury, which has the lower half of the blade sheathed, into the uterus through the previously dilated cervix ; make one or more incisions, about an inch long and from a quarter to half-an-inch deep, upon the surface of the tumour. The great danger of the operation is the introduction of septic matter ; to diminish this risk, Greenhalgh employs the actual cautery with an olive-shaped bulb to incise the mucous membrane and at the same time to destroy the heart of the tumour ; he also uses it to burn away, from time to time, portions of the tumour as they protrude through the capsule.

It is evident that the cautery can be used only when we have an interstitial fibroid which has forced itself into one lip of the cervix and projects markedly into the roof of the vagina (*v.* fig. 244) ; or when a submucous fibroid has dilated the os sufficiently to become accessible to the cautery. The cautery, of which the Paquelin is the most convenient form, reduces the dangers of hæmorrhage and septic infection to a minimum.

The separation of the tumour should be left to the natural efforts, and may extend over a period of months ; during this time, to promote uterine contractions, the patient is kept fully under the influence of ergot. Greenhalgh remarks that " spontaneous expulsive efforts shortly followed the use of the cautery."

Should sloughing of the tumour occur during the process of natural enucleation, we interfere to remove the tumour rapidly. Even although there is no sloughing it is sometimes necessary to shell the tumour out of its bed.

The detachment of the tumour from its capsule may be effected by A. R. Simpson's nail curette (fig. 249). It is intended, as its name implies, as a substitute for the finger nail which would be the best instrument were it only strong enough to scrape through the tissues.

Thomas has devised a similar instrument which has the form of an elongated spoon with a serrated edge (fig. 250); it is worked with a pendulum-like movement of the hand. The advantages claimed for it are that it limits hæmorrhage and, from its concave form, 'hugs the tumour' so as not to cut deeply into the uterine wall. Before operating, he measures with a whalebone probe the extent of attachment of the tumour to the wall of the uterus. He has 'operated more than twenty times with this spoon-saw, and its efficiency becomes more and more apparent with increasing experience.'

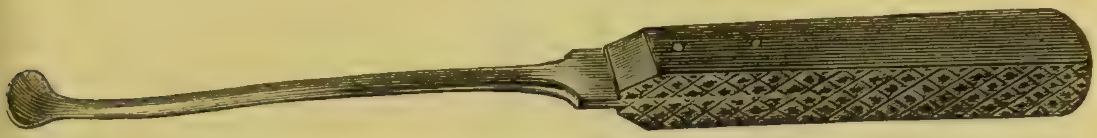


Fig. 249.
A. R. Simpson's nail curette, 1½ (A. R. Simpson).

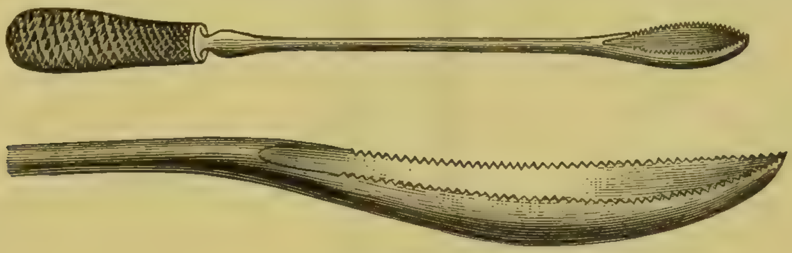


Fig. 250.
Thomas' spoon-saw (Thomas).

Marion Sims employs the enucleator represented at fig. 251, and operates as follows. The tumour is drawn down to the os uteri; the capsule is incised with scissors, and detached as far as possible with the fingers; the enucleator is passed in between the tumour and its capsule, and worked round the former so as to free it on all sides; a tumour-hook is now hooked deeply into its substance, with which it is dragged down while the enucleator is used to sever any remaining connections; when necessary, the os is incised to allow it to pass.

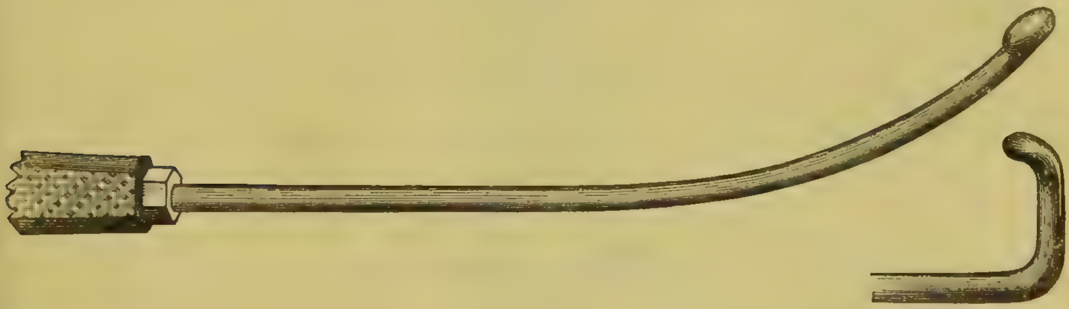


Fig. 251.
Side-view (to show curve) and face-view (to show cutting edge) of Marion Sims enucleator (Marion Sims).

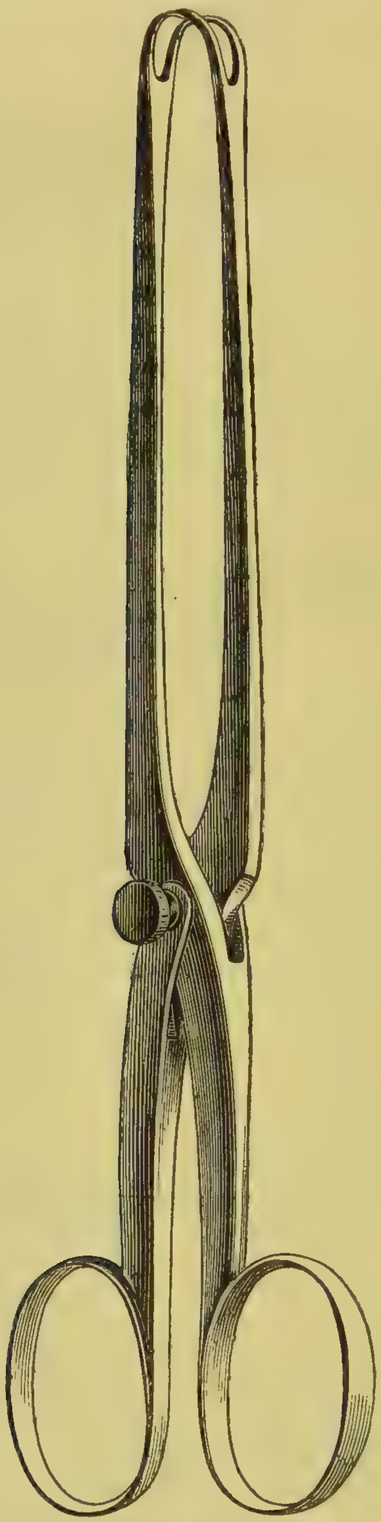


Fig. 252.

Sir James Simpson's volsella for seizure of utra-uterine fibroids—two-thirds size. The blades are separable, and lock like a pair of midwifery forceps; after being locked, the blades are fixed with a screw-pin which serves as a joint (A. R. Simpson).

When the tumour has been so far enucleated, spontaneously or by the artifical means described, the extraction of it is often difficult on account of its size. When it projects into the vagina, we lay hold of it with large volsella (fig. 252) and make traction while the hand is passed up to the base of the tumour to sever any connection between it and its bed. The fundus uteri is at the same time pressed down and steadied by an assistant. In the case of large tumours, midwifery forceps are used for extraction. To allow a tumour of large size to be extracted, it may be necessary to divide it with scissors or the ecraseur and remove it in portions; we may even require to incise the perineum, if the vaginal orifice be small.

Thus with regard to *enucleation* and removal per vaginam, it is evident that, from the risks of the operation, we should interfere only when the severity of the symptoms justifies a dangerous operation or when nature is unable to complete the process of expulsion. The circumstances most favourable for removal by this means are when the tumour is small and loosely connected with the uterus, or when it has been already 'born' into the lax and roomy vagina of a multipara.

b. REMOVAL THROUGH THE ABDOMINAL WALLS BY LAPAROTOMY.

This operation is of recent date, and medical opinion with regard to it is in the same state as it was in regard to ovariotomy twenty years ago. Although operators have had the experience of ovariotomy to fall back upon, the mortality is as yet 50 per cent. On the other hand we must remember that, as fibroid tumours do not endanger life in the same way that ovarian tumours do, the operation for their removal, being apparently associated with so much more danger, is only had recourse to in extreme that is in unfavourable cases. Whether the removal of fibroid tumours by laparotomy will in the future take the place that ovariotomy has at last gained for itself, we are not in a position to say. The fact that these tumours threaten the life of the patient only in exceptional cases makes this improbable. In reporting some cases of successful operation to the London Obstetrical Society in April 1880, Knowsley Thornton says that he believes 'that the removal of uterine fibroids by laparotomy is not only justifiable, but is an operation with a position in the immediate future in no way second to that now held by ovariotomy.'

The merits of the operation cannot be judged from statistics, because each operator has tried a different method. Statistics enable us rather to compare the success of different methods of operating than to decide on the merits of the operation itself.

The following table gives the results of the leading operators.

Pean,[1]	up to	Nov.	1879,	had operated	46	times with	30	recoveries.
Spencer Wells,[2]	,,	Dec.	1878,	,,	25	,,	10	,,
Billroth,[3]	,,	Mar.	1880,	,,	25	,,	10	,,
Köberlé,[4]	,,	Dec.	1877,	,,	19	,,	9	,,
Schrœder,[5]	,,	Dec.	1879,	,,	18	,,	11	,,
Hegar and Kaltenbach[6]	(new method), ,,	Sep.	1881,	,,	12	,,	11	,,
Thornton,[7]	,,	April	1880,	,,	10	,,	6	,,
Thomas,[8]	,,	Sep.	1880,	,,	7	,,	4	,,

From the above table two things are evident: (1) the mortality from the methods taken together has been great (45 per cent.); (2) the results from Hegar's method, to be presently described, are remarkably successful (mortality 8·3 per cent.). The number of cases (twelve) is not great; it remains to be seen whether this method will be equally successful in other hands.

Under laparotomy we include (1) the removal of pediculated subserous fibroids in which the uterus is left untouched, and (2) the amputation of a portion of the uterus along with the tumours. The ovaries may or may not be removed at the same time. When a portion of the uterus is cut away, it is necessary, should the operation be during the period of sexual activity, to remove the ovaries; fatal hæmorrhage has occurred when they were left, and even abdominal conception and pregnancy.

The operation may be divided into three stages;—(1) the opening into the abdominal cavity, (2) the diminution of the size of the tumour and its extraction, (3) the treatment of the stump.

1. The opening into the abdominal cavity is made just as in ovariotomy (*v.* Chap. XXII).

2. The diminution of the size of the tumour is necessary when it is so large that it cannot be projected through the abdominal incision.

When the tumour is cystic, it is diminished by puncturing the cysts before extraction. Large solid tumours are diminished by gouging out portions, which is often accompanied with considerable hæmorrhage. Pean diminishes the size of such tumours by 'morcellement': the tumour is transfixed with a double thread which carries in the wires of two of Cintrat's serre-nœuds (fig. 257); by means of these, two portions are removed with little loss of blood; this process is repeated until the tumour is sufficiently reduced in size to be drawn through the abdominal wound.

---

[1] Académie de Méd.—Séance, 18 Nov. 1879.

[2] Brit. Med. Journ., May and Dec. 1878.

[3] Cited by Hegar and Kaltenbach—Operative Gynäkologie, S. 419.

[4] Gusserow—Neubildungen, etc., S. 90.

[5] Krankheiten der weiblichen Geschlectsorgane, S. 244.

[6] Die operative Gynäkologie, S. 420.

[7] London Obs. Trans., April 1880.

[8] Diseases of Women, 1880, p. 551.

3. The treatment of the stump is either by the *intra-peritoneal* or *extra-peritoneal* method.

When it is small and consists only of the pedicle of the tumour, it can be ligatured and *dropped* into the peritoneal cavity as in ovariotomy; when it is large and especially when (from the removal of a portion of the uterus, it consists of a uterine stump, the dangers of hæmorrhage and peritonitis have led most operators to adopt the *extra-peritoneal* method. When a portion of the uterus is cut away along with the tumour, there is not only a greater risk of hæmorrhage from the larger pedicle but there is a track opened for septic infection as the uterine canal communicates through the vagina with the external air.

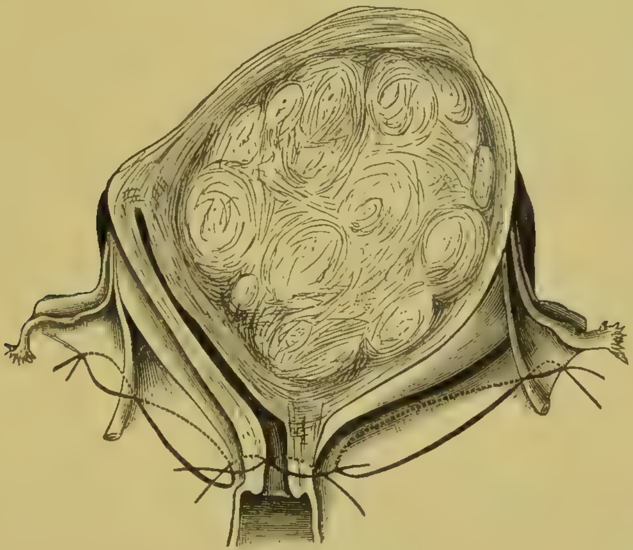


Fig. 253.

Position of ligatures in amputation of uterus at level of os internum. The cervix is ligatured in two portions, so that a ligature controls each uterine artery. Each broad ligament is ligatured in two portions which meet at the round ligament. The outer ligature controls the ovarian artery (Schrœder).

Schrœder, however, prefers the *intra-peritoneal* method even when there is a uterine stump. We shall describe his method of amputation of the uterus at the level of the os internum, as we saw him do it in the case of a large submucous fibroid of the anterior wall which endangered the patient's life by hæmorrhage. The abdominal incision was made in the ordinary way. Vascular adhesions passing from the tumour to the pouch of Douglas were ligatured at two points and divided between these. The ovarian arteries—the course of which is seen in Plate III.—were ligatured on each side. (These can be recognised by feeling their pulsation with the finger; or by holding the ligament against the light, when their course is easily seen). A double silk ligature was carried on a needle from behind through the cervix so as to come out at the bottom of the vesico-uterine pouch in front; this was divided and the end of each half carried backwards through the broad ligament of its respective side, just external to the cervix, and knotted to its corresponding end; the cervix was thus tied in two portions, each uterine artery—the position of which is seen in Plate III.—being controlled by a ligature (fig. 253). The tumour, with the body of the uterus and the ovaries, was cut away rapidly, with a large knife, above the ligatures. The uterine stump was cut in a V shape; and first the muscular walls were adapted with coarser, then the peritoneal covering with finer silk sutures (fig. 254). The patient made a good recovery.

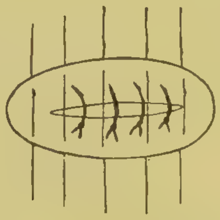


Fig. 254.

Ligaturing of the intra-peritoneal stump of the cervix. The deep ligatures which bring the muscular tissue together are represented as tied. The superficial ones bring only the peritoneal flaps together.

The *extra-peritoneal* method has been carried out by the following methods:—

The ligature or clamp,
The clamp and cautery,
The serre-nœud,
The elastic ligature.

The extra-peritoneal method was, we believe, first attempted by Spencer Wells. Comparing the two methods, he says "when it has been possible to secure the pedicle and fix it outside the wound in the abdominal wall, the result has been much more satisfactory." Of his 25 cases, setting aside 3 of which the method is not specified, 13 were extra- and 9 intra-peritoneal. In 6 of the 13 cases, the pedicle was retained in the wound by means of *a clamp;* in the rest by means of *the ligature,* aided in some cases by use of a pin.

The searing of the stump with the *actual cautery* without any ligatures, is the modification of the extra peritoneal method adopted by Thomas. He uses the *clamp*, represented at fig. 255, to arrest hæmorrhage during the amputation of the uterus and while the pedicle is being seared. It is in two separate portions; the one half is placed below the neck of the tumour or uterus, and the other then adapted to it and screwed down. To prevent retraction of the pedicle, it is before cauterisation transfixed above the clamp with long wire needles. After cauterisation the clamp is loosened, but left *in situ* for fourteen days so as to be screwed up should hæmorrhage occur.

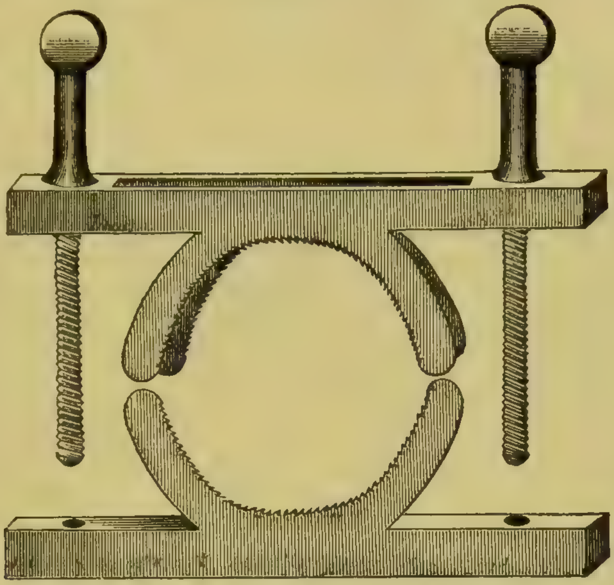


Fig. 255.

Thomas' clamp for securing the stump extra-peritoneally in the extirpation of fibroid tumours; the halves of the clamp are represented as lying apart (Thomas).

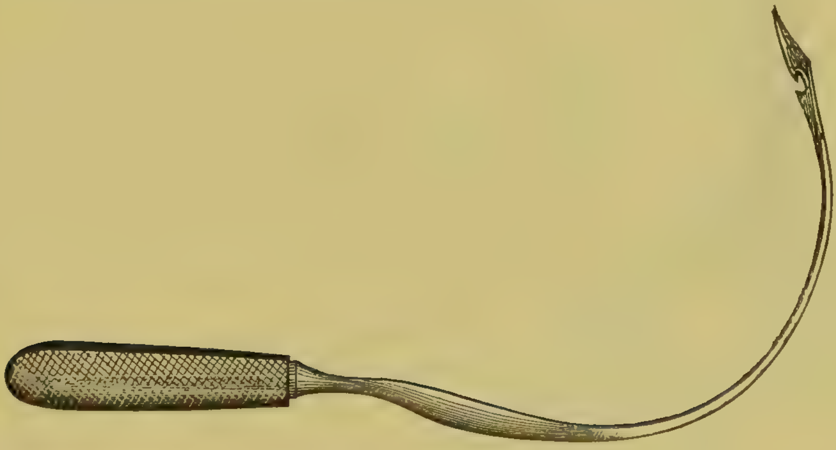
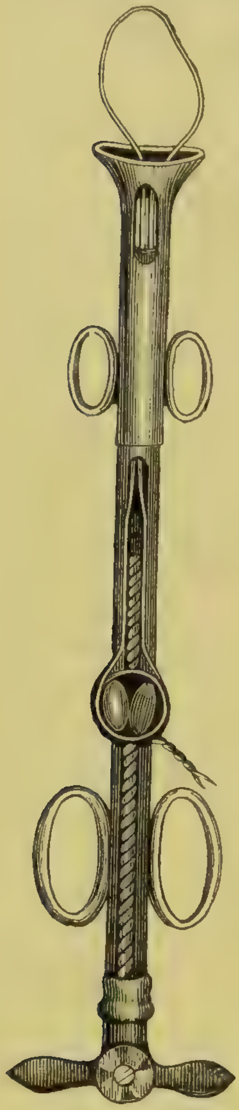


Fig. 256.

Péan's curved needle for carrying the wires through the stump of the cervix (Leblond).

The extra-peritoneal method has met with great success in the hands of Péan of Paris, who has the merit of having elaborated it as a distinct method. He operates as follows. The tumour having, if necessary, been reduced by "morcellement," it is drawn out of the abdomen and held perpendicularly by an assistant. The operator, having ascertained with a sound the relations of the bladder (which only in rare cases requires to be dissected off), transfixes the cervix with two strong wires at right angles to each other. Below these wires, the curved needle represented at fig. 256 is carried through the cervix and drags back a double wire. This wire is divided, and each half is fitted into a *serre-nœud* of Cintrat (fig. 257) by means of which it is both tightened and twisted. The tumour and uterus are amputated above the wires. The pedicle is placed in the abdominal wound, and is kept from retracting into the abdomen by means of the wires and the serre-nœuds; these are left in position so that they may be tightened in case of hæmorrhage.



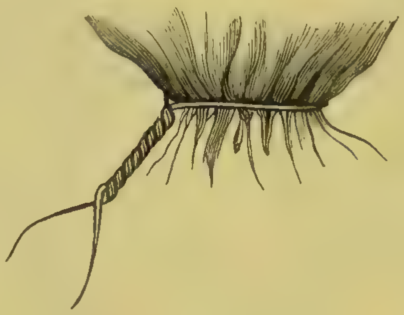


Fig. 257.

Cintrat's serre-nœud (Hegar). The wire after having been placed round the neck of the uterus or tumour is fixed on the two knobs which travel on the thread of the screw. On turning the handle when the middle piece is held firm at the larger loops, we tighten the noose; when the head piece is held at the smaller loops, we twist the wire. The result is seen to the right hand side (Leblond).

The elastic ligature was introduced by Kleeberg. Its method of employment has been devised and carried out by Hegar of Freiburg, in whose hands (as already said) it has produced the most brilliant results. Hegar's method consists in 'constriction of the uterine stump with elastic ligatures, exact closure of the abdominal cavity by stitching the peritoneum round the stump, and antiseptic treatment of the latter with the cautery and chloride of zinc.' The abdominal incision is always made long enough to allow the tumour to be projected through it without artificial diminution. Temporary sutures are placed along its margins to keep the peritoneum in relation to the skin. Vascular adhesions are ligatured in two places and divided between. The tumour is laid hold of with a dry towel by one assistant and raised out of the abdomen, while another presses the edges of the abdominal wound behind the advancing tumour; the greatest care is required to hold the tumour steadily and vertically, as the stretched broad ligaments readily tear—leading to hæmorrhage. The relations of the bladder and the ovaries having been exactly ascertained, the elastic ligature is placed round the cervix below the seat of amputation. This consists of a double ply of india-rubber ligature 5 millimetres thick. While kept at full stretch it is brought round the uterus and firmly knotted. Should this constriction of the whole stump be judged insufficient, it is further ligatured in two portions with the elastic ligature. The needle represented at fig. 258 is used to carry through the stump a double ligature, which is then divided and tied round each half. The tumour and uterus are amputated above these ligatures. The peritoneum is now carefully adapted round the neck of the stump below the elastic ligatures; the silk suture, which brings only the edges of the peritoneum together in the bottom of the wound just below the pedicle, is looped into the side of the latter (fig. 259, *a*) underneath the ligature (fig. 259, *b*): the margins of the peritoneum above the pedicle are united in a similar way; the next two sutures of the wound bring together only the peritoneum, while those further up bring together all the coats of the abdominal wall. Thus there is produced a space which surrounds the pedicle and is floored by peritoneum; to keep this space thoroughly dry and aseptic, is the aim of the after treatment. The projecting end of the stump is thoroughly cauterised; the raw surfaces round it are painted with solution (3-10 per cent.) of chloride of zinc, and cotton wadding, which has been soaked in a 2 per cent. solution of the chloride and then thoroughly dried, is packed round the stump.

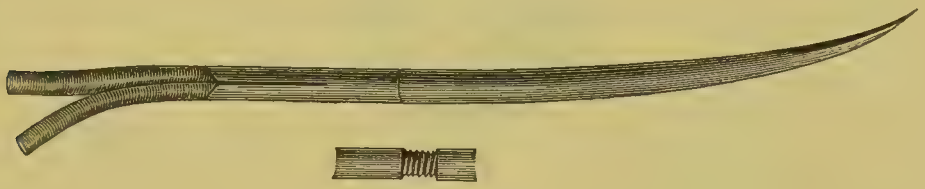


Fig. 258.

Needle for carrying through elastic ligature. It consists of a sharp curved point, and a canula split halfway up the side. A loop of the elastic ligature, stretched till it is thin, is drawn with a thread into the canula, which is then screwed into the steel point (Hegar and Kaltenbach).

Finally, the end of the stump alone is touched with 100 per cent solution. The whole is covered with protective silk and carbolised wool, and the antiseptic dressing laid on so that it can be easily lifted.

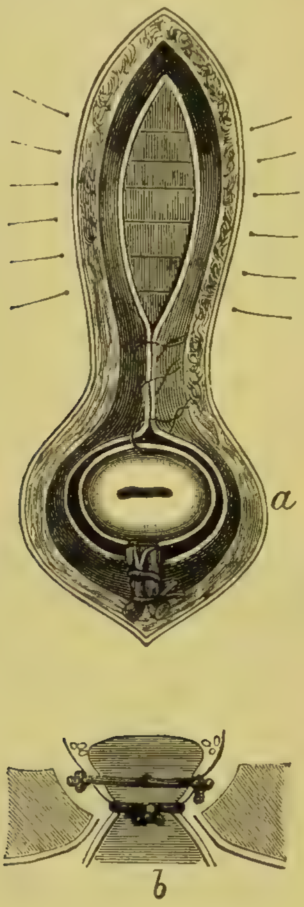


Fig. 259.

Treatment of fibroid tumours by elastic ligature (Hegar and Kaltenbach).

a, Abdominal incision with the stump in its lower angle; only the peritoneum is brought together with the lower sutures, while the upper sutures take in the whole abdominal wall. *b*, Same in section, to show the trough floored by the peritoneum round the stump and the position of the elastic ligatures.

The space round the stump is kept thoroughly dry by repeated dressing (three or four times daily, according to amount of discharge) with the chloride of zinc wool; the pedicle is pared away gradually with scissors to diminish its size, to allow the chloride to act more thoroughly, and to prevent pus from burrowing. The elastic ligature is clipped away about the tenth day.

Battey's operation has been frequently performed to check the menorrhagia associated with fibroid tumours and with good result (*v.* p. 188).

CHAPTER XXXVI.

FIBRO-CYSTIC TUMOUR OF THE UTERUS.

LITERATURE.

Atlee—Ovarian Tumours: Philadelphia, 1873. *De Sinéty*—Op. cit., p. 413. *Gusserow*—Neubildungen etc., S. 102. *Heer*—Ueber Fibrocysten des Uterus: Zurich, 1874. *Leopold and Fehling*—Archiv. für Gyn., Bd. VII., S. 531. *Peaslee*—Ovarian Tumours: London, 1873. *Rein*—Archiv. f. Gyn., IX., S. 414. *Schrœder*—Op. cit., S. 213. *Spencer Wells*—Diseases of the Ovaries: London, 1872. *Spiegelberg*—Archiv. f. Gyn., VI., S. 348. *Thomas*—Op. cit., p. 551.

SYNONYM—Cysto-fibroma.

Attention has been directed only of recent years to this, the rarest form of uterine tumour. Its pathology is now being worked out, and at present we group under this head tumours which may afterwards be shown to be anatomically separable. Since ovariotomy has come to be extensively practised, they have derived their clinical importance from a close resemblance to ovarian tumours.

PATHOLOGY.

The majority of fibrocystic tumours are simply fibroid tumours which have become softened. The spaces between the bundles of fibrous tissue open out and contain serum; the trabeculæ between adjoining spaces give way, which allows these to run together to form larger cavities. Fig. 260 shows this in a *subserous fibroid*, which form most frequently undergoes this change.

The term 'cystic' is, it is evident, misleading as applied to this form of tumour. The cavities are not "cysts," that is, they do not possess a special wall.

Koeberlé was the first to suggest that some forms of fibrocystic tumour might be due to *dilated lymphatics*. Leopold and Fehling have carefully described a case in which the cavities were lined with endothelium. The fluid from these cavities was of a clear yellow colour, *and coagulated* as soon as it was exposed to the air; fibrin was present in it. To this form the name of *Fibromyoma lymphangiektodes* has been given. Atlee says that this coagulation of the fluid—formation of colourless blood-clot—is diagnostic of the fluid from *all* fibrocystic tumours, and may be relied on to distinguish them from ovarian. Spiegelberg records a case in which this spontaneous coagulation of the fluid was observed, but the most careful microscopic examination could detect no epithelial lining of the cavities. A transition case has been described by Rein, in which the cavities were not themselves lined with endothelium but *communicated* directly with the lymphatic spaces.

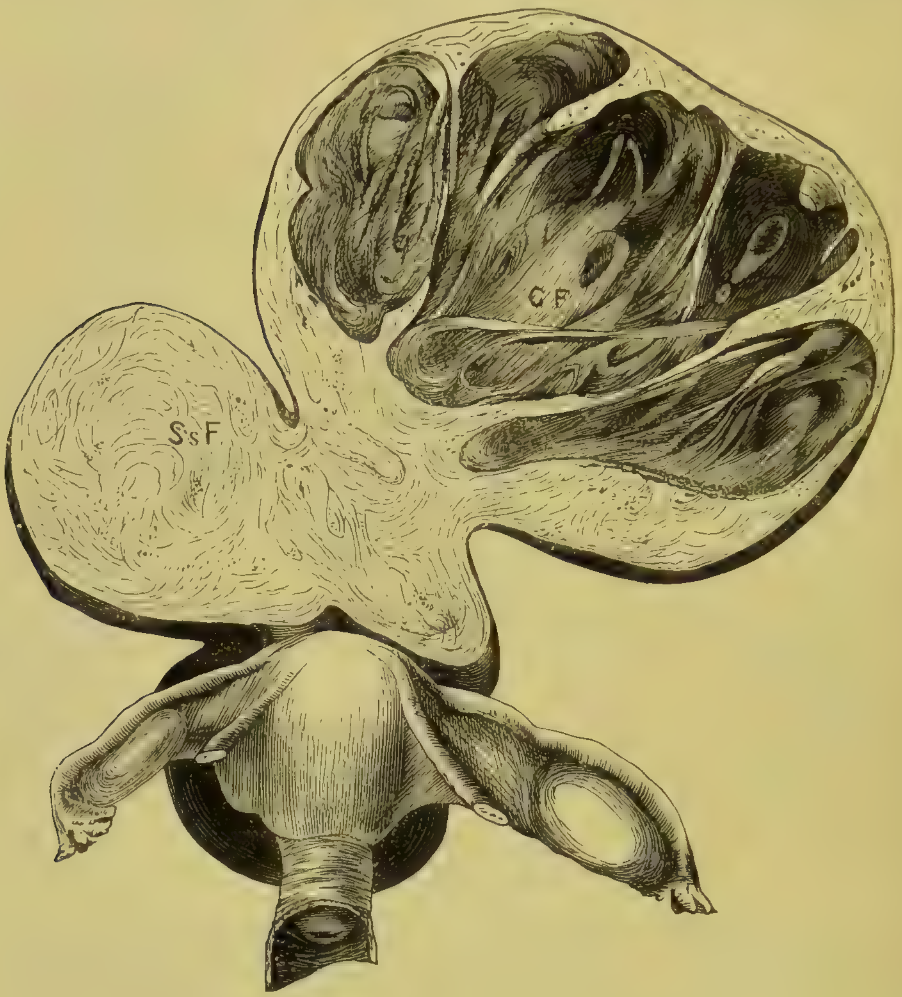


Fig. 260.

Large three-lobed fibroid springing from the fundus by a somewhat thin pedicle, of which C F is cystic, while S s F and the dark shaded mass behind the uterus are subserous. This, along with two smaller fibroids growing from the posterior surface of the uterus was removed by Laparotomy (Schrœder).

Mucoid degeneration of a fibroid tumour has been described by Virchow as Myxomyoma. In this case the interstitial tissue contained fluid rich in mucin and with numerous nucleated round cells.

SYMPTOMS.

These are the same as those of fibroid tumours, except that their increase in size is rapid. As they are usually subserous, menorrhagia is not often present.

DIAGNOSIS; DIFFERENTIAL DIAGNOSIS.

Their diagnosis is often difficult, as the difference in consistence between the more solid and the fluid parts may escape detection. The most important point to make out is *the relation to the uterus*, and the *displacement* of the latter which is produced. To ascertain its connection with the uterus, we make the examination per rectum: to do this thoroughly, it may be necessary to anæsthetise the patient and to introduce two fingers; the uterus is at the same time drawn down with the volsella. As to the displacement of the uterus, it is elevated towards the abdomen; with an ovarian tumour, it is depressed to the front or to the back. The sound is now passed; if the uterine cavity is increased in size, and more especially if the movement of the tumour by an assistant is immediately communicated to the sound, the tumour is probably uterine.

Differential Diagnosis. Their diagnosis *from ovarian tumours* is the most important and, at the same time, the most difficult. As in the majority of cases they are merely altered fibroid tumours, their differentiation *from a simple fibroid* is merely a matter of degree of softness. Their diagnosis from ovarian tumours is of importance as regards ovariotomy, though with greater experience in the extirpation of fibroids and a lower mortality, this may come to be of less importance.

TREATMENT.

The treatment consists in removal through the abdominal walls, according to the method described for fibroid tumours (*v.* p. 401).

CHAPTER XXXVII.

POLYPI OF THE UTERUS.

LITERATURE.

Barnes—Op. cit., p. 195. *De Sinéty*—Op. cit., p. 419. *Gusserow*—Op. cit., S. 160. *Hegar und Kaltenbach*—Die operative Gynäkologie: Stuttgart, 1881, S. 493. *Hicks, Braxton*—Three cases of very large polypi of the uterus, etc: Obstet. Journ. of Great Brit., Jan. 1879. *Matthews, Duncan*—Edin. Med. Journal, July 1871; and Obstet. Journ., 1873, p. 497. *Simpson, Sir J. Y.*—Op. cit., p. 704. *Thomas*—Op. cit., p. 558. *Underhill*—On the Structure of three cervical Polypi, and The Structure of a true mucous polypus of the cervix: Edin. Obst. Soc. Trans., vol. IV., pp. 231 and 241.

By the term "Polypus" is understood a pediculated tumour attached to the mucous membrane of the uterus. It includes the following tumours, which are anatomically distinct:—

(1.) Submucous fibroids, which have become pediculated and are in process of extrusion;

(2.) Mucous polypi;

(3.) Pediculated cystic follicles;

(4.) Placental polypi.

For clinical reasons, it is convenient to use the term polypus in its general sense as implying an external form alone; the symptoms produced by these tumours resemble one another, and their exact nature is sometimes not made out till they are removed. Pathologically, the term should be limited to mucous polypi. It is confusing to speak of a fibroid tumour which has a broad base of attachment as a submucous fibroid, and of one which has a pedicle as a fibrous polypus. The polypoidal projections formed by pediculated ovula Nabothii are only pediculated retention cysts. Placental polypi are not true new-formations.

1. *Pediculated submucous fibroid tumours* form the so-called "fibrous polypi." They spring from the *muscular* wall of the uterus, usually from the *body* which, as we have seen, is more commonly the seat of fibroid tumours than the cervix. They are of *firm* consistence, of a size

varying from a goose's egg and upwards, and are of a rounded or pyriform shape (fig. 261), sometimes elongated and constricted through the pressure of the uterine walls (fig. 243); the surface is smooth or marked with furrows corresponding to the fasciculi of fibrous tissue.

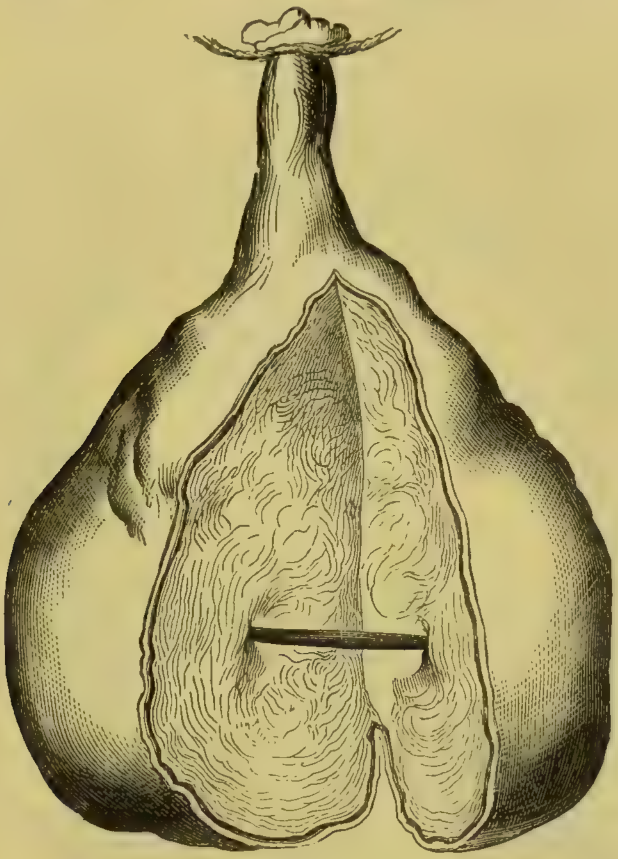


Fig. 261.

Fibrous polypus laid open to show its identity in structure with a fibroid tumour (Sir J. Y. Simpson).

Sometimes they are of such a size that, although lying in the vagina, they fill the pelvis and press on the bladder and rectum; the uterus is then raised above the pelvic brim (just as it is elevated when the vagina is distended with fluid), and is felt as a smaller body riding on the top of the tumour. Adhesions may form between the surface of the fibroid and the vagina, producing the impression that the tumour springs from the vaginal mucous membrane.*

The pedicle consists of a narrowing of the calibre of the tumour towards its base of attachment, or of a distinct stalk which may be long enough to allow the fibroid to lie at the vulva. As fibroid tumours are sparingly vascular, the pedicle does not as a rule contain large vessels. When a pediculated submucous fibroid lies in the cavity of the uterus, its sets up uterine contractions which lead to its expulsion: there is a stage at which it lies partly within the uterus (fig. 262), partly

---

* Braxton Hicks—Loc. cit.

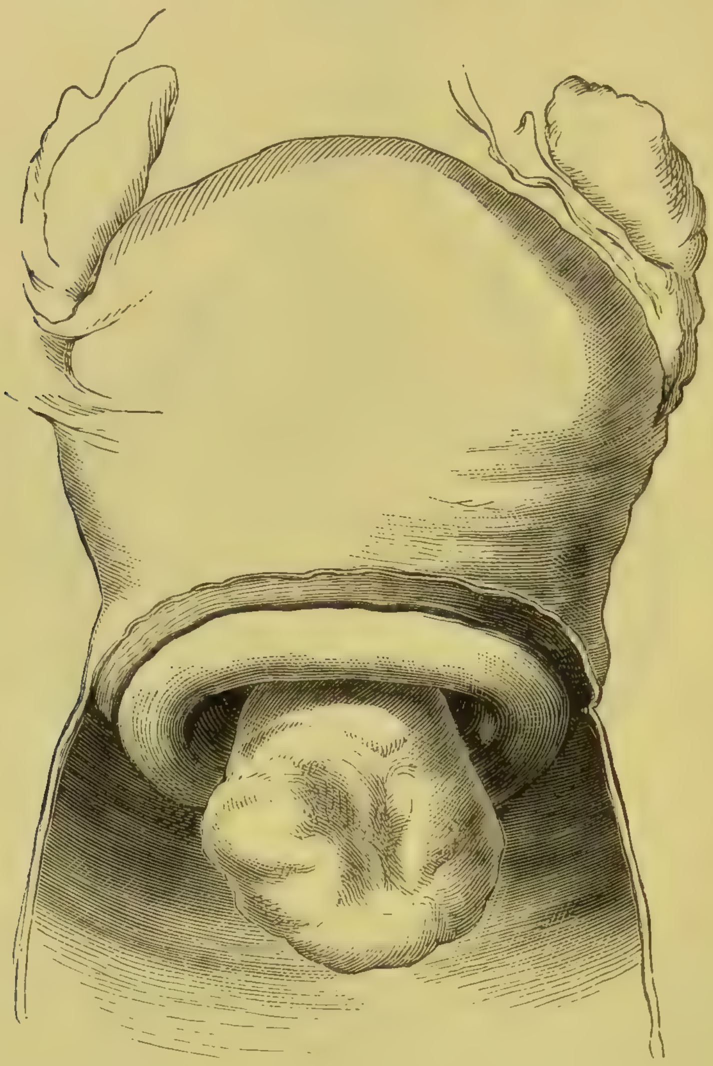


Fig. 262.
Intra-uterine sub-mucous fibroid which is becoming vaginal (Sir J. Y. Simpson.)

in the vagina (the portion constricted by the cervix has been mistaken for a pedicle, and only the lower lobe of the hour-glass tumour removed); finally, the whole tumour lies in the vagina but still maintains its connection with the uterus through its pedicle (fig. 263). The congestion of the fibroid excites uterine contractions specially at the menstrual period, and thus favours its expulsion. At those times only, we may have the cervical canal temporarily dilated and the polypus projecting through it; after the period, the contractions pass off and the polypus is retracted into the uterine cavity. This condition is fully described by French writers under the name of "polypes à apparitions intermittentes." Its

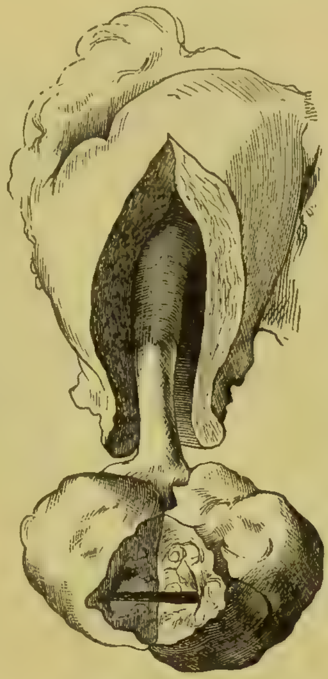


Fig. 263.

Submucous fibroid which has come to lie wholly in the vagina (Sir J. Y. Simpson).

practical importance is that we should examine sometimes at the menstrual period, when a polypus (not recognisable at other times) may be felt through a dilated cervix. They have the microscopic structure described at p. 375 (*v.* fig. 261).

2. *Mucous polypi* are developed from the *mucous membrane* of the uterus, most frequently from that of *the cervix.* They are of *soft* pulpy consistence, of about the size of an almond—rarely larger—and have a flattened form; usually, there are more than one present (fig. 264). They are extremely vascular and have the microscopic structure of the mucous membrane from which they are developed.

The typical cervical polypus has the structure seen at fig. 265; the student should compare this with the section of the normal mucous membrane given at p. 19. From the fact that the gland ducts appear as channels on the surface, it was described by Oldham as the "channelled polypus." Sometimes the polypus shows also the stratified epithelium of the vaginal aspect of the cervix, as in a specimen described by Underhill; he supposes that in this case it sprang from the margin of the os externum: he describes also a polypus which sprang from the *vaginal aspect* and showed only the stratified epithelium. These polypi sometimes form the starting point of malignant disease; Underhill traced the commencement of sarcomatous formation in one case.

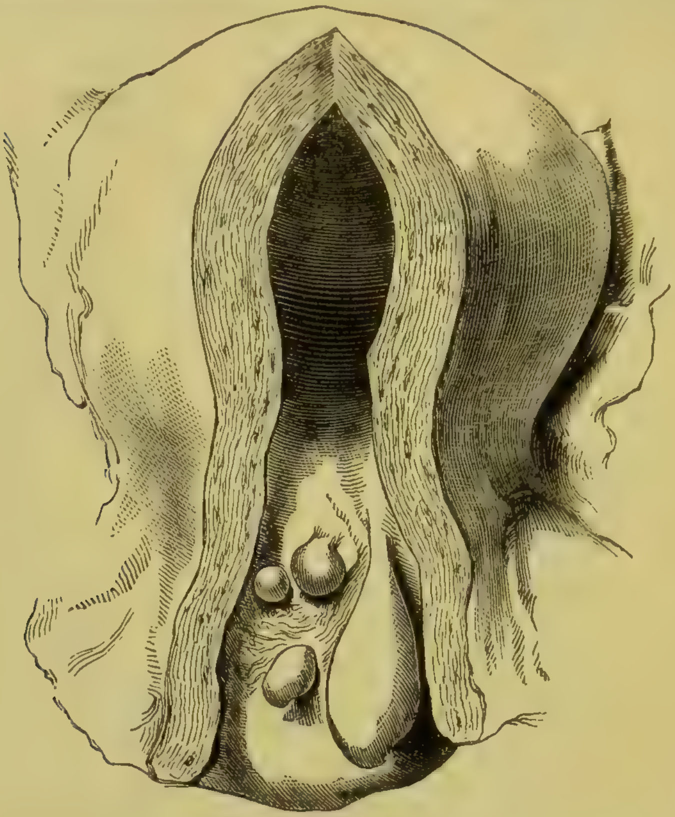


Fig. 264.
Group of mucous polypi growing in the cervix uteri (Sir J. Y. Simpson).

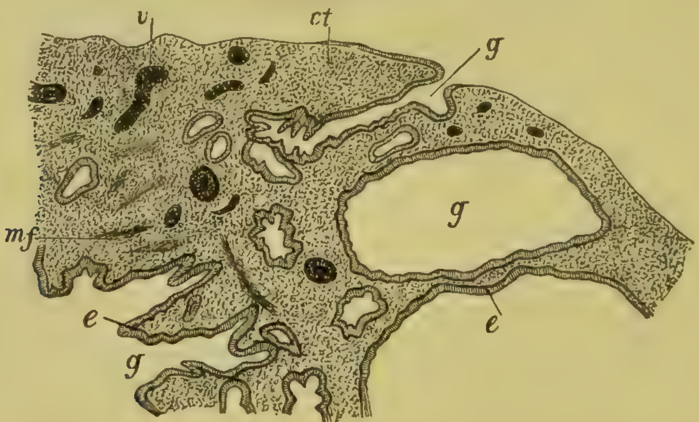


Fig. 265.
Section of a mucous polypus of the cervix $\frac{10}{1}$. *g* dilated glands, *e* epithelium, *mf* muscular fibre. *v* bloodvessel, *ct* connective tissue (de Sinéty).

De Sinéty divides them into two groups according as they spring (1) from the cervix, (2) from the body of the uterus. Each has the characteristic epithelium (see p. 18) lining the ducts and cysts; the former have the columnar non-ciliated epithelium of the cervix, the latter the ciliated cylindrical epithelium of the body.

3. *Pediculated nabothian follicles* have been already described under cervical catarrh (p. 276).

In old people we often find the whole mucous membrane of the uterus covered with small polypoidal cysts. We have already referred to this condition as a final stage of chronic endometritis (p. 288).

4. *Placental or fibrinous polypi.* These are produced as the result of incomplete detachment of the placenta; in some cases we can trace placental villi in their structure. On the surface of this irregularity of the mucous membrane, blood coagulates; and thus the fragment of placenta grows larger through being coated with fibrin. This increase in size may go on until the polypus is the size of an egg. This form of polypus is not a new formation and only finds a place here on account of its polypoidal form.

SYMPTOMS.

These are Hæmorrhage,
Leucorrhœa,
Dysmenorrhœal pains,
Sterility,
Irritation and discomfort.

The *hæmorrhage* shows itself first as an increase of the ordinary menstrual flow; afterwards, it comes at irregular intervals. In the case of a submucous fibroid, it comes from the uterine mucous membrane which is hypertrophied. In the mucous polypus, it comes from the tumour itself which is vascular and bleeds easily; when the polypus protrudes through the cervix, there may be hæmorrhage whenever the patient strains or after coitus. It is important to remember that a small polypus has produced a fatal hæmorrhage* (*v.* the preparation represented at fig. 101). In other cases the drain of blood, though not directly fatal, may produce profound anœmia. The cachectic appearance of the patient, thus induced, may be such as to lead us to form a strong prepossession in favour of the existence of malignant disease before we proceed to physical examination.

Hence the importance of ascertaining and removing the cause of the hæmorrhage.

The *leucorrhœa* is due to the endometritis which is always present. The polypoidal retention cysts are the result of a chronic catarrh of the cervix or uterus. It is disputed whether mucous polypi are the cause or the result of the inflammatory changes; de Sinéty inclines to the latter view. When the polypus comes to lie in the vagina, it produces an irritating vaginal leucorrhœa.

---

* Barnes records the case of a woman of 26 years of age in which a polypus the size of a walnut produced a fatal hæmorrhage.

The *dysmenorrhœal pains* are due to the muscular efforts of the uterus to expel the polypus, and are most marked when the polypus has descended to the os internum or lies in the cervical canal.

In rare cases the presence of the foreign body in the uterus has produced the sympathetic phenomena of pregnancy—pigmentation of the breasts and abdomen, and morning sickness.

Sterility is occasioned by the mechanical obstruction of the polypus, either in the cervical canal or at the entrance to the Fallopian tubes. The obstruction in one case was not sufficient to prevent the spermatozoa from passing upwards, but hindered the entrance of the fertilised ovum into the uterine cavity and thus produced Fallopian tube gestation.

A pediculated fibroid may form a serious complication to labour, in preventing the progress of the child's head; such a polypus has been laid hold of with the forceps under the impression that it was the presenting head.

DIAGNOSIS.

1. *When the polypus has dilated the os externum*, it will be recognised by the finger per vaginam. If it be larger than a walnut and of firm consistence, and if the uterine cavity be increased in length, it is a pediculated fibroid tumour. If it be small and of a pulpy consistence, it is a true mucous polypus; mucous polypi do not, as a rule, produce hypertrophy of the uterus.

Having learned that there is a pediculated body in the vagina or cervical canal, carry the finger upwards to ascertain its point of attachment; if this be high up in the uterine cavity the tumour is a pediculated fibroid; if it springs from the cervical mucous membrane, it is probably a mucous polypus.

On bimanual examination, the uterus is found to be enlarged in the case of pediculated fibroids; it is not enlarged with mucous polypi, unless from associated chronic metritis.

The speculum shows that the surface of the true mucous polypus has a bright cherry-red colour, which contrasts with the darker red of the cervical mucous membrane embracing it. The appearance of the fibroid tumour depends on the condition of the investing mucous membrane which is often ulcerated or sloughing. When the capsule has given way, the fibrous substance of the tumour is seen to be of a paler colour.

2. *When the uterus is enlarged but the os externum not dilated,* the diagnosis is more difficult (fig. 266). If the uterus be markedly enlarged and of firm consistence and (the possibility of pregnancy being excluded) the sound pass for 4 or 5 inches, there is probably a submucous fibroid tumour. It is difficult to determine whether it is pediculated or not. We endeavour first to pass the sound round the tumour or upwards on different sides of it. Fig. 248 shows how the sound passes in a case of a pediculated tumour attached to the fundus. The sound must be used with care as its use is not unattended with risk; laceration of the mucous membrane, with the introduction of septic matter, has resulted from too free and repeated exploration in

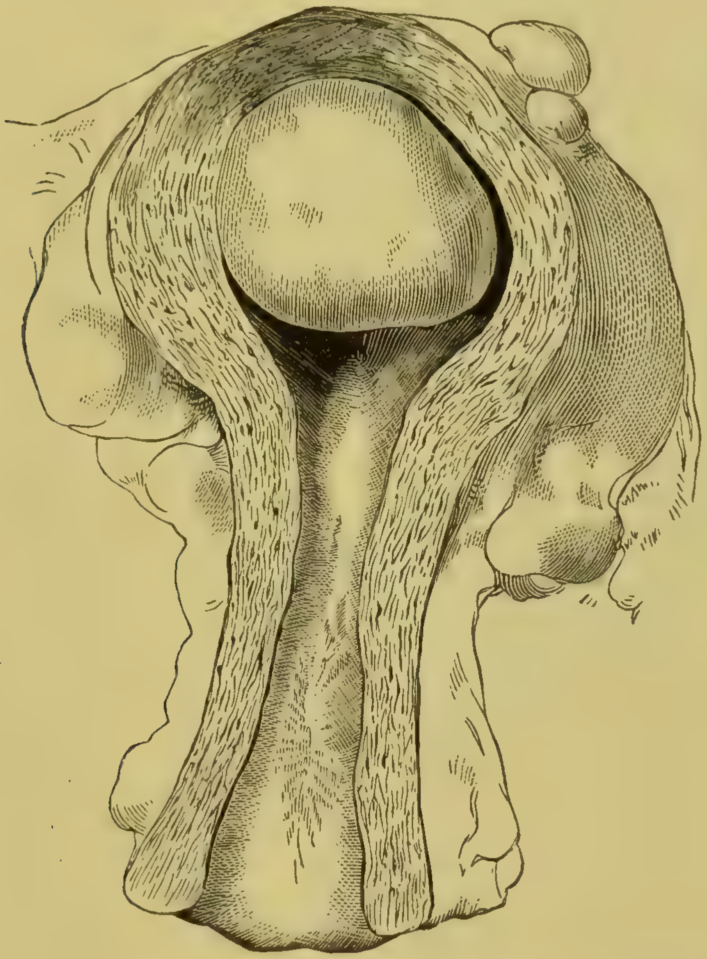


Fig. 266.

Pediculated submucous fibroid, springing from the fundus, which has not dilated the cervical canal (Sir J. Y. Simpson).

this way. Dilatation of the cervix and exploration with the finger are sometimes necessary to ascertain whether the fibroid be pediculated, and to what part of the uterus it is attached.

3. *When the uterus is not much enlarged*, the diagnosis is very difficult. The possibility of a fibroid tumour is excluded. A small mucous polypus, however, may exist in the uterine cavity and escape detection with the sound. In such a case, it is only recognised on dilating the cervix and exploring the uterine cavity with the finger.

The *curette* is a valuable aid to diagnosis when the actual exploration of the uterine cavity with the finger is not desirable. By its use we diagnose and treat the case at the same time. Thus irregularity of the uterine surface (which is easily detected by the curette) and the character of the scrapings removed, may show that we have to do with pediculated retention cysts or placental polypi.

DIFFERENTIAL DIAGNOSIS.

The characters which distinguish a pediculated fibroid from a mucous polypus are its larger size, firmer consistence, and its springing from the body of the uterus. The uterine cavity is increased in size. We find probably other fibroid tumours interstitial or subserous.

A pediculated fibroid hanging down into the vagina, may readily be mistaken for the inverted fundus uteri; this is most likely to happen when there is much hæmorrhage from the former, and when concomitant pelvic inflammation makes examination difficult. A true diagnosis here is all-important, as removal of the fibroid may save the patient's life; while amputation of the uterus, under the supposition that it was a fibroid, might lead to disastrous consequences. The preparation shown at fig. 267 is interesting in this connection. The case had been sent into hospital as one of inverted uterus. It is evident how the form of the tumour in the vagina and the fact that it bled freely, would in the absence of further examination lead to this mistake.

Given a tumour the size of a pear hanging down through the cervical canal into the vagina, we wish to make sure that it is not the inverted fundus. First, sweep the finger carefully round the neck and note whether the mucous membrane of the cervical canal is reflected on to the neck of the tumour; sometimes inflammatory adhesions round the neck produce a condition simulating inversion. Now make the Bimanual; if the body in the vagina be a fibroid, the uterus will be in its normal place. The abdomino-vaginal examination is often difficult on account of the body in the vagina; therefore pass the finger into the rectum, through the anterior wall of which we can distinctly feel whether the cervix has a truncated end above (inversion) or passes up into the body of the uterus (fibroid); the abdomino-rectal makes this more

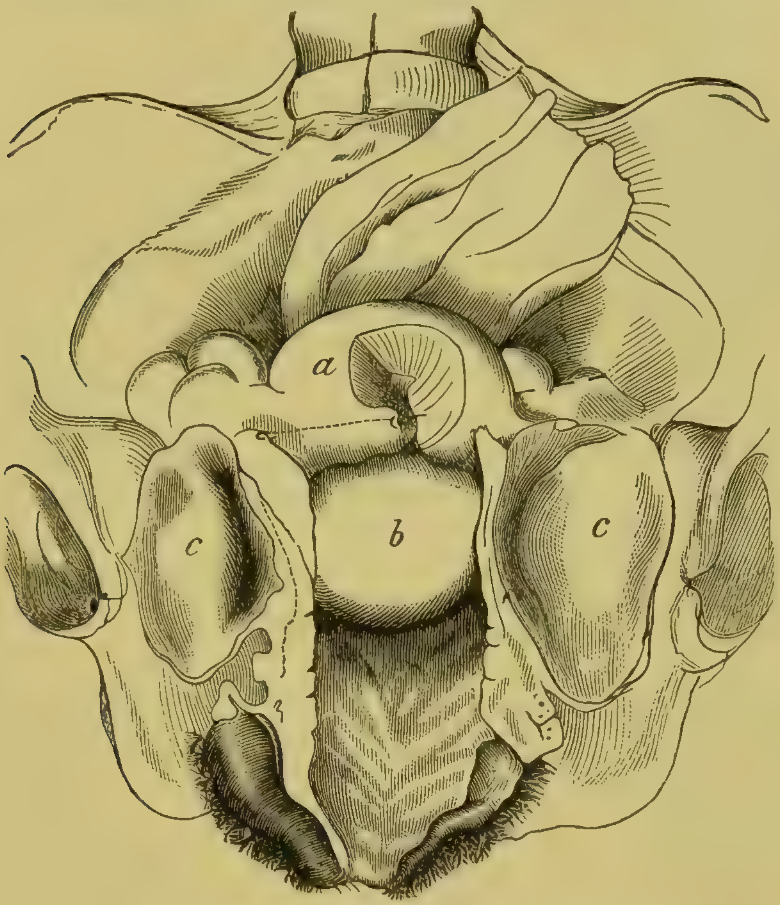


Fig. 267.

a, uterus with a portion of the anterior wall cut out; *b*, pediculated fibroid attached to back wall immediately above os internum. The front of the bony pelvis has been removed; *cc*, halves of divided bladder (A. R. Simpson).

evident. When examination is difficult and the diagnosis doubtful, we should not hesitate to give chloroform and make a thorough examination; it is well to be prepared to operate at the same time, if necessary.

Finally use the sound, which is the crucial test. Sweep the finger carefully round the neck of the tumour and feel for a depression corresponding to the os, into which endeavour to introduce the sound. If it passes for two and a half inches or more and is then arrested, it is probably in the uterine cavity; make sure of this by pressure with the hand on the abdominal wall, or per rectum.

When the tumour in the vagina fills the pelvis or rides above the brim, so that the finger cannot reach the pedicle or feel whether the os is present, the diagnosis is very difficult. We rely on careful abdominal palpation to ascertain whether the uterus can be felt riding on the top of the tumour.

We must not forget that we may have both conditions present, *i.e.*, pediculated fibroid + a certain amount of inversion.

PROGNOSIS.

The prognosis as to *danger to life* will depend on the hæmorrhage. Wherever a polypus is present, we should advise its removal.

As to *the operation*, the removal of mucous polypi and smaller fibroids is a safe and easy operation. The fear of hæmorrhage from the pedicle of a fibroid tumour, which led to the treatment by ligature, has been found by experience to have been exaggerated. Where there is a rigid cervix to be dilated before we can remove the tumour, where the tumour is large so that it must be removed in portions, where there is a thick pedicle and consequently a larger raw surface, the operation will be a more serious one and the prognosis given more guardedly.

Should there be pregnancy, the polypus may be removed without interrupting its course. If it be of such a size as to interfere with labour, it should be removed as soon as discovered.

TREATMENT.

Whenever it is necessary to dilate the cervix for diagnosis, we should have instruments ready to remove the tumour at the same sitting. The dilatation is effected by laminaria tents, or by Tait's graduated dilators. A good method is to place a laminaria tent in the cervix to start the dilatation; after six or eight hours chloroform the patient, fix the cervix with volsella, and introduce the graduated dilators in succession till the cervical canal is wide enough to admit the index finger; remove the polypus by the means to be described; wash out the uterine cavity with 1 to 60 carbolic solution.

Small *polypoidal projections* are removed with the curette, as described under endometritis, followed by the application of carbolic acid.

Mucous polypi are twisted off with the forceps, shown at fig. 268. It is advantageous to use forceps with a catch, as this keeps a steady hold of the tumour and leaves the operator's fingers free to twist the forceps round.

In removing *fibroids*, we first ascertain the seat of insertion and size of the pedicle. When the tumour is small, we can learn this by the fingers; when so large that we cannot get the fingers past the tumour to the pedicle, we probe round its base with the sound or, laying hold of the tumour with forceps, endeavour to rotate it and thus test the thickness of the pedicle.

The pedicle will yield to torsion with the forceps. This is the simplest method and should always be tried in the first instance; the

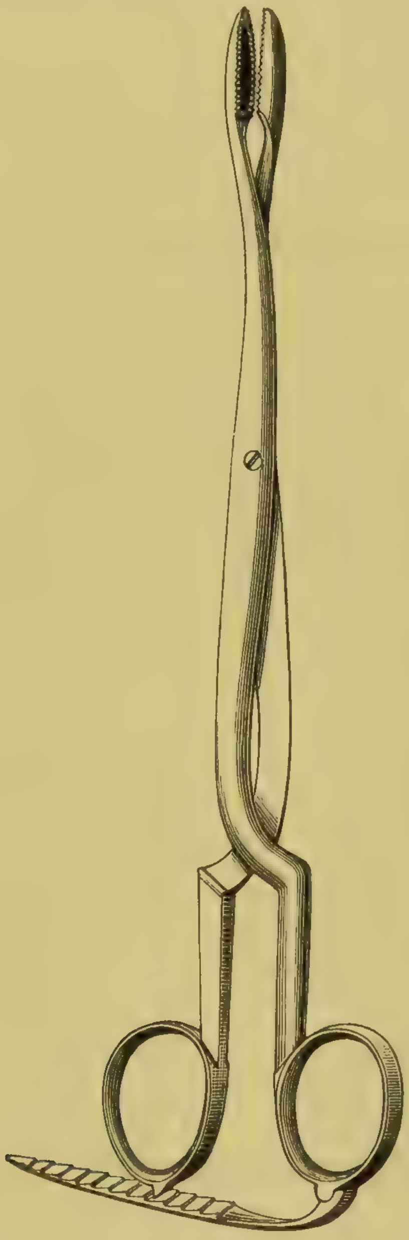


Fig. 268.

Forceps with catch, for removing mucous polypi.

forceps shown at fig. 252, or a pair of Nelaton's forceps (fig. 135), are most suitable. If this fail, divide the pedicle with curved scissors. Make traction with the forceps to render the pedicle tense; too forcible traction might produce inversion. Guarding the uterine wall with the fingers, carry in the curved scissors. In cutting, make the scissors hug the surface of the tumour and thus keep clear of the uterine wall. To divide the pedicle Sir James Simpson introduced the polyptome (fig. 269). Strangulation by ligature, formerly widely practised, is now entirely abandoned; the sloughing stump was a fruitful source of septicœmia.

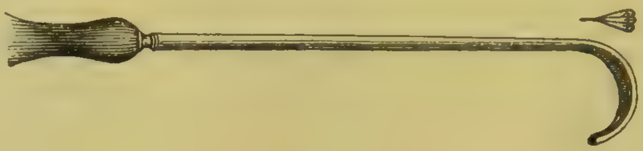


Fig. 269.
Sir J. Y. Simpson's polyptome (Sir J. Y. Simpson).

When the pedicle is of considerable thickness, it may be divided with the ecraseur or with the galvano-caustic wire. The wire ecraseur is preferable to the chain ecraseur, as it is more easily applied. For the nature and method of use of the ecraseur, the student is referred to treatment of Carcinoma of the Cervix. The galvano-caustic wire has been used extensively by Byrne* of Brooklyn, whose paper on this subject should be consulted.

When the size of the tumour makes the pedicle inaccessible, it must be diminished. This is best effected by Hegar's method: traction is made on the tumour, which is at the same time incised in a spiral manner with scissors; the tumour is thus (as it were) unwound, till finally the pedicle is reached and divided.

Chloroform is not necessary for the removal of smaller polypi. The section of the pedicle is painless; if pain be present on tightening the ecraseur round the neck of a polypus, the operator should examine carefully again to make sure that the wire is not constricting the inverted fundus. Where the polypus is large and the operation tedious, it is better to have the patient anæsthetised as the operator has then more freedom.

* Electro-cautery in Uterine Surgery: New York, 1873.

CHAPTER XXXVIII.

CARCINOMA UTERI (OF CERVIX): PATHOLOGY AND ETIOLOGY.

LITERATURE.

Barbour—Case of Carcinoma of the Female Pelvic Organs: Edin. Med. Jour., July 1880. *Barnes*—Op. cit., p. 821. *Gusserow*—Die Neubildungen des Uterus: Stuttgart 1878, S. 177; and Ueber Carcinoma Uteri, Volkmann's Samml. klin. Vor., N. 18. *Ruge and Veit*—Zur Pathologie der Vaginalportion, Erosion und beginnender Krebs: Stuttgart, 1878. *Schrœder*—Op. cit., S. 264. *Simpson, Sir J. Y.*—Op. cit., p. 140. *Tanner*—On Cancer of Female Sexual Organs: London, 1863. *Virchow*—Ueber Cancroide und Papillargeschwülste, 1850. The student will find the fullest references to literature in Gusserow and in Ruge.

By Carcinoma Uteri is usually understood Carcinoma of the Cervix, because in by far the larger proportion of the cases (98 per cent) this is the seat of the disease. The rarer condition of Carcinoma of the Body will be described separately.

PATHOLOGY.

On no subject in pathology has more been written and a greater variety of opinion expressed than on carcinoma. We have endeavoured to arrange, in the table on the page following, the facts most important for the student to know.

CLASSIFICATION.

There are three varieties of carcinoma usually given in the English text-books. These are medullary (encephaloid) and scirrhous cancer, and epithelioma. Now the distinction between the first two is merely a question of degree; in the former the cellular element, in the latter the fibrous stroma is in excess. When we say that medullary cancer is frequent but scirrhus rare, we only mean that carcinoma runs a rapid course when it occurs in the uterus. The distinction between these two and epithelioma is more marked and is therefore given in the table, but it is very doubtful whether it rests on a pathological basis.

From the above it is evident that we are not yet in a position to make a scientific classification. The division according to clinical

CLASSIFICATION ACCORDING TO CLINICAL FEATURES	FORMS	ORIGIN	POSITION	PROGRESS	
CARCINOMA progresses rapidly; produces metastasis, affects connective tissue rapidly.		from the cervical epithelium of constricted cervical glands (Klebs); from plugs of the deepest layers of squamous epithelium on the vaginal aspect of cervix (Waldeyer); from connective tissue cells of cervix (Virchow).	in substance of cervix.	produces thickening, then ulceration;	When ulceration and breaking down have been produced, these forms are no longer distinguishable.
EPITHELIOMA OR CANCROID progresses slowly; does not produce metastasis; spreads by extension.	flat (flache cancroid)	from the cubical epithelium of cervical canal (Klebs); from plugs of the deepest layers of squamous epithelium on vaginal aspect of cervix (Waldeyer).	superficial within cervical canal.	excavates cervix;	
	papillary	from the deepest layers of squamous epithelium on vaginal aspect of cervix (Klebs and Waldeyer); from connective tissue cells (Ruge and Veit).	superficial, outside of cervix.	spreads downwards into vagina (cauliflower excrescence).	

features into *true carcinoma* and *cancroid* (καρκίνος and εἶδος, *like cancer*) is convenient: it expresses nothing more than that in some cases progress is more rapid than in others; and that the disease in the one case produces metastatic deposits, in the other remains local.

ORIGIN.

As regards the origin, there are two distinct views. That the disease arises from *connective tissue cells alone*, is the view maintained by Virchow and his followers; while Thiersch and Waldeyer hold that in *all cases* it originates in *epithelial cells.* In the cervix, as possible sources, there are two varieties of epithelium; the squamous on the vaginal aspect, the cubical lining the canal. In the *flat* cancroid of the cervical canal, it arises from the cubical epithelium which lines the latter; in the papillary form, it originates in the cells of the rete Malpighi on its outer aspect (Klebs). It will be seen that Waldeyer holds the view that, in all cases, it arises from the latter only.

The most recent investigations into the origin of carcinoma are by Ruge and Veit. According to them carcinoma arises, in the majority of cases, from a transformation of the connective tissue cells; even the papillary form which produces the so-called cauliflower excrescence, although it apparently springs from the epithelium, is developed from the connective tissue cells. The connective tissue stroma becomes vascular and almost like granulation tissue. The young cells, which are apparently produced from the connective tissue corpuscles, take on an epithelial character. These observers never saw plugs of epithelium extending downwards into the connective tissue.

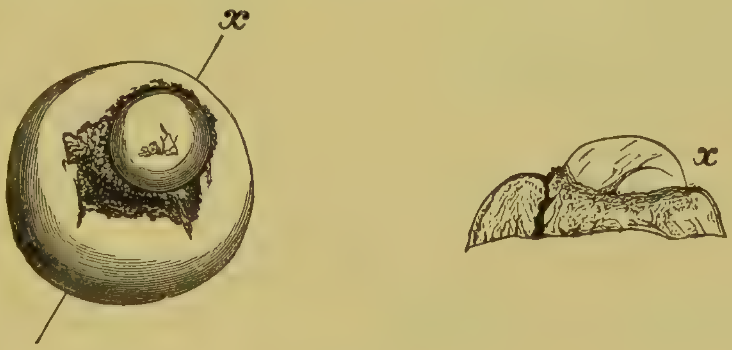


Fig. 270.
Carcinomatous nodule growing in one lip of the cervix and pushing the mucous membrane outwards
The figure to the right is a section of the cervix made through the line x (Schrœder).

POSITION.

There are apparently three places in the cervix where carcinoma may develope. It may begin as hard *nodules in the substance of the cervix* underneath the mucous membrane; these increase in size, come to the surface of the mucous membrane (fig. 270) and produce ulceration. More rarely does it commence in the *interior of the cervical canal* and spread along its mucous membrance so as to excavate the canal. In the third place, it may appear *on the vaginal aspect of the cervix* as an irregular papillary tumour, which, extending downwards into the vagina, attains considerable size. It is then known as the cauliflower excrescence. Whether this form of carcinoma is the result of degeneration of simple papillary growths or is malignant from the commencement, it is impossible to say.

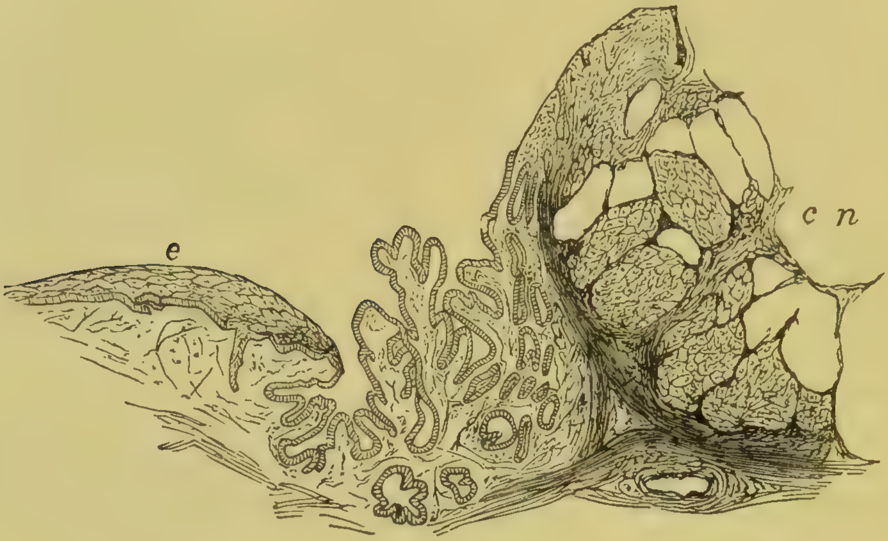


Fig. 271.

Microscopic section of a portion of the cervix uteri seen in fig. 270. *e* squamous epithelium in several layers; *c n* carcinomatous nodule; between these is seen a portion of inflamed mucous membrane covered with a single layer of epithelium (Schrœder).

PROGRESS.

During the first stage we may distinguish the three forms, but after ulceration has occurred they pass into one another and are no longer distinguishable.

As regards the further progress, Schrœder distinguishes *three modes of the spreading* of the disease: first, upwards, into the body of the uterus; second, downwards, into the vagina; and, third, into the connective tissue of the pelvis. This last is the most important. It takes place either by a continuous infiltration of the adjacent connective tissue, or as a chain of nodules running in the direction of the utero-sacral ligaments; these nodules, probably, correspond to lymphatic glands.

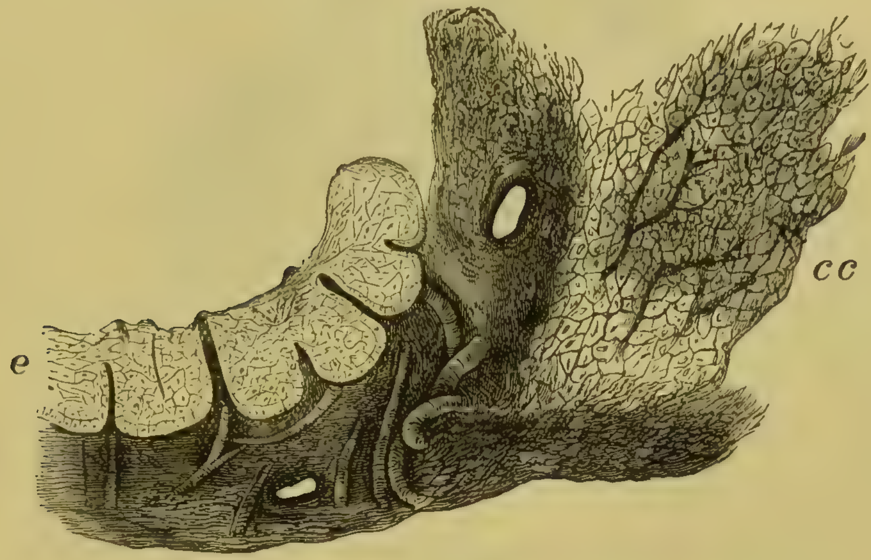


Fig. 272.

Section of a flat cancroid (epithelioma) of the cervix. *e* squamous epithelium; *c c* carcinomatous cells between these is seen some granulation tissue (Schrœder).

EXTENSION TO NEIGHBOURING ORGANS.

In its further progress, the carcinomatous growth invades the surrounding organs. Pushing its way forwards in the cellular tissue between the *bladder* and the uterus, it involves the mucous membrane of the former; it first produces vesical catarrh, then sloughing of the walls, and finally vesico-vaginal fistula. The bladder is affected in a considerable proportion of cases; of 311 cases of carcinoma this occurred in 41 per cent., fistula resulting in 18 per cent (Gusserow). From the position of the ureters, they are frequently involved. The carcinomatous growth may press upon the ureters near their point of entrance into the bladder, or it infiltrates their walls and the consequent thickening produces constriction at the part affected. Thus results dilatation of the ureter above, which produces hydronephrosis and finally atrophy of the kidney. The frequency of this condition will be apparent from the fact that Blau found it present in 57 out of 93 post-mortem examinations. More rarely does the carcinomatous infiltration extend backwards into the *rectum* and produce recto-vaginal fistula; of 282 cases the rectum was affected in 18 per cent, fistula resulting in 8·5 per cent (Gusserow). When both bladder and rectum have been opened into, a common cloaca is produced as in fig. 273.

Perforation into the *peritoneal cavity* is rare. The peritoneum is not simply pushed forward, but is taken up into the carcinomatous growth. As this process goes on, adhesions are constantly being formed between the walls of the peritoneum in front of the growth so that it does not project free into the cavity beyond. These adhesions further prevent the peritoneal cavity from being opened into when the carcinomatous mass breaks down.

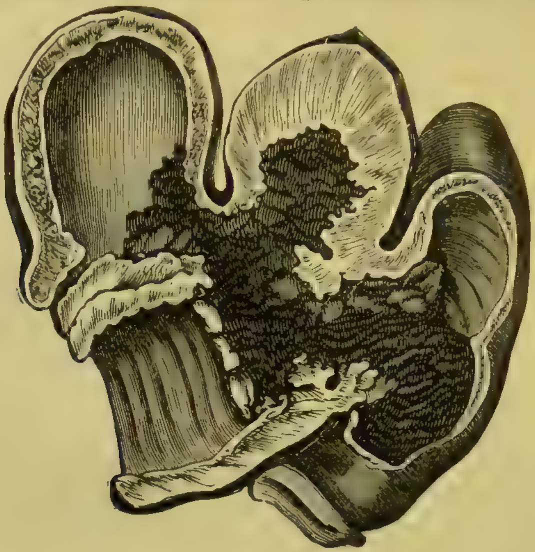


Fig. 273.

Carcinoma beginning in the cervix uteri, and ending in the production of recto-vesico-vaginal fistula (Farre).

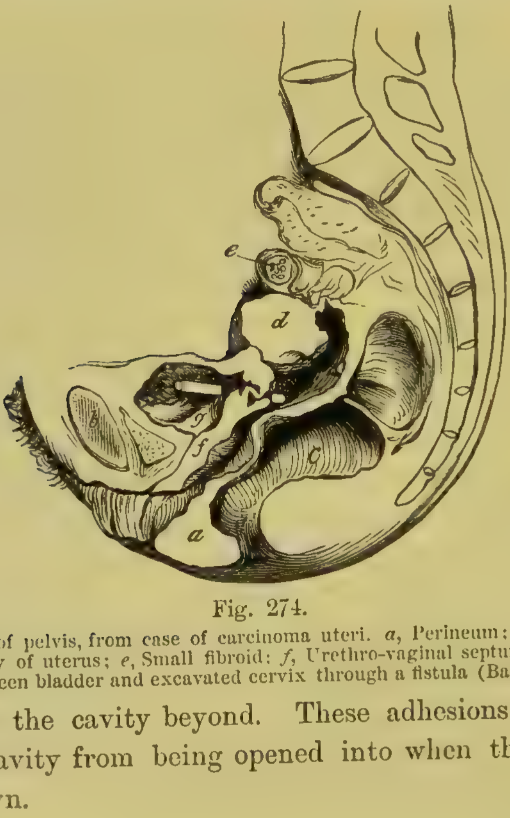


Fig. 274.

Vertical mesial section of pelvis, from case of carcinoma uteri. *a*, Perineum; *b*, Symphysis pubis: *c*, Rectum; *d*, Body of uterus; *e*, Small fibroid: *f*, Urethro-vaginal septum; *g*, Bladder. A small tube passes between bladder and excavated cervix through a fistula (Barbour).

The accompanying sections, made from post-mortem preparations, will serve to illustrate some of the points noted above.

Points to be noted in fig. 274.

1. Seat of disease in the *cervix*;
2. Complete destruction of the cervix and lower segment of the uterus;
3. Production of an irregular cavity through the extension of the disease in *three* directions through the cellular tissue—
    (*a*) Behind the uterus,
    (*b*) Between the uterus and the bladder,
    (*c*) Between the vagina and the bladder;
4. The pouch of Douglas entirely obliterated and partially replaced by the carcinomatous excavation, the vesico-uterine pouch shortened by adhesions, perforation into the peritoneal cavity at one point;
5. Bladder small and contracted, carcinomatous fistula;
6. Rectum intact.

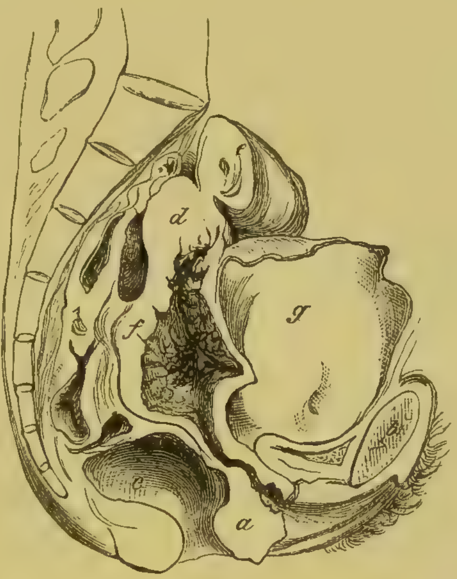


Fig. 275.

Vertical mesial section of pelvis, from case of carcinoma vaginæ et uteri. *f*, points to vagina eroded by disease; *e* is a malignant growth attached to uterus. Other letters as in fig. 274 (Barbour).

Points to be noted in fig. 275.

1. Vagina (as well as cervix) affected, the nymphæ had a cartilaginous consistence, inguinal glands enlarged—although not shown in figure;
2. Extension of the disease along the mucous membrane of the uterus, excavating it though not destroying the walls to the same extent as in fig. 274;
3. Partial obliteration of the pouch of Douglas;

4. Bladder dilated through pressure on the urethra, its walls apparently not involved ;
5. Rectum intact.

ETIOLOGY.

The female sex is more liable to carcinoma than the male. According to Sir J. Y. Simpson's statistics, the proportion is as $2\frac{1}{2}$ to 1. These statistics are drawn from the annual reports of the Registrar-General for England during the years 1847-1861. During that time there were 87,348 fatal cases of carcinoma, of which 61,715 were among women and 25,633 among men. For the year 1860, the deaths from carcinoma among men were ·97 per cent of the total male mortality, among women were 2·2 per cent. The cause of this greater relative frequency is connected with the development of the sexual organs in the female. Up to puberty, the mortality (from carcinoma) of the sexes is the same ; afterwards, the relative proportion of female to male deaths gradually rises till it attains its maximum about the age of 50, after which it falls away again (fig. 276).

The diagram on page 433 is based on the statistics of 91,058 deaths in Great Britain. It brings out three facts : the total number of deaths in each sex increases with age to a certain point ; the increase among women is relatively the greater ; it reaches its maximum at an earlier age with the female sex.

The most frequent seat is in the uterus, where fully one-third of the total cases occur ; the next in frequency is the mamma.

Although the immediate etiology of carcinoma is unknown, there are certain causes general and local which favour its development.

1. The *general predisposing causes* are the following :—

Heredity ;
Age ;
Depreciation of the vital powers.

The influence of *race* is brought out in Chisholm's statistics, which show that carcinoma is more than twice as frequent among the white population as among the black. As regards *heredity in families*, much less stress is now laid upon this than formerly.

According to Gusserow's statistics, in 1028 cases heredity was only proven in 79, that is in about 7·6 per cent. Schrœder placing the statistics of Sibley and of Barker together shows that heredity has only been proven in 8·2 per cent ; Picot places it at 13 per cent. These figures show that we cannot lay much stress on heredity as a predisposing cause. On the other hand we must

TABLE AND DIAGRAM OF COMPARATIVE FATALITY OF CARCINOMA IN MALE AND FEMALE, ACCORDING TO AGE.

Out of 91,058 deaths from carcinoma

751 males, 773 females died under 15 years.
562 ,, 659 ,, ,, from 15 to 25 years.
1244 ,, 3176 ,, ,, ,, 25 ,, 35 ,,
2717 ,, 9975 ,, ,, ,, 35 ,, 45 ,,
4973 ,, 16,668 ,, ,, ,, 45 ,, 55 ,,
7220 ,, 15,813 ,, ,, ,, 55 ,, 65 ,,
6286 ,, 11,840 ,, ,, ,, 65 ,, 75 ,,
2637 ,, 4616 ,, ,, ,, 75 ,, 85 ,,
364 ,, 689 ,, ,, ,, 85 ,, 95 ,,
20 ,, 39 ,, ,, above 95 ,,

(Sir J. Y. Simpson.)

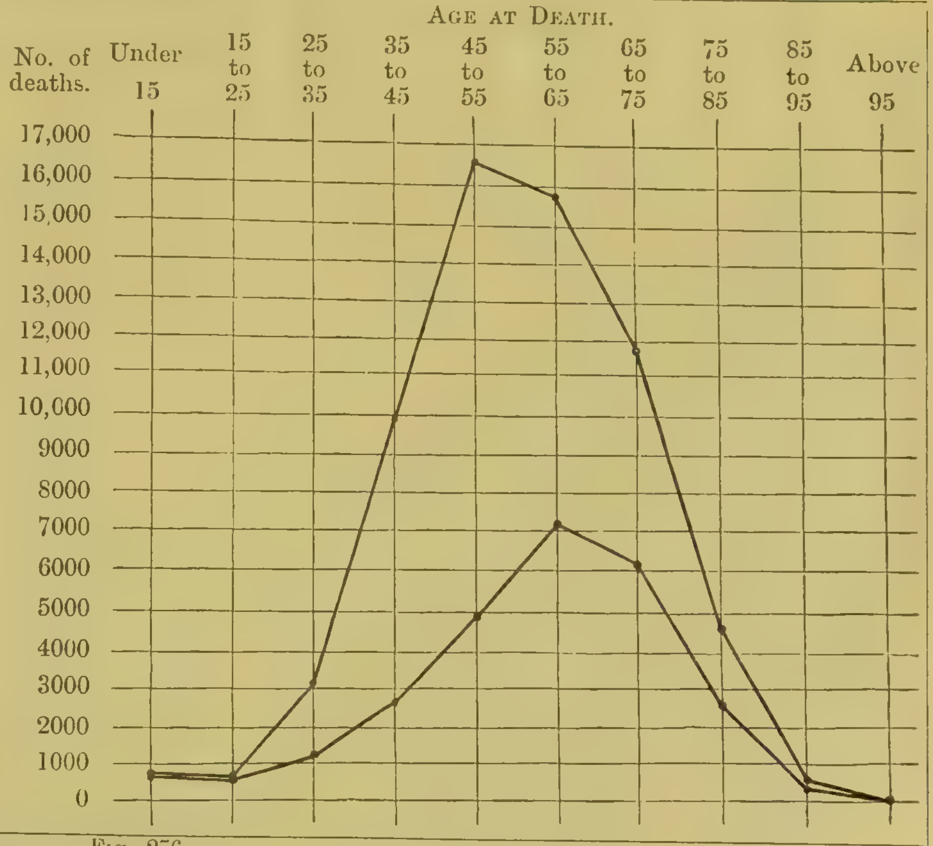


Fig. 276.
In the diagram, the *upper* line indicates mortality in female, the *lower* that in the male.

remember that these statistics are drawn principally from hospital reports, from a class of people who know little about the former history of their families.

Age has undoubtedly a considerable influence upon the frequency of this disease. This is evident from the table given on page 435. Gusserow collected statistics of 2270 cases reported by various authorities. The mortality per cent. for various ages is represented by the curve in the diagram on page 435. From the table it is evident that carcinoma does not occur before puberty. The proportion of cases below 20—2 in 2270—is so small that it need not be taken into account. The first glance at the diagram would lead one to believe that the increasing frequency of the disease is due to the development of the functional activity of the sexual organs, but a more careful consideration shows that the increase continues and reaches its maximum after the latter has ceased. The explanation lies probably in the fact that the power of the tissues for resisting morbid development diminishes with age. This table should be compared with that for Fibroid Tumours on page 384.

Whatever tends to *depreciate the vital powers* favours the occurrence of this disease. We meet with it more frequently among the poorer classes, where there is insufficiency of food with privation and hardship. Schrœder contrasts, in this respect, the development of carcinoma with that of myoma. In his polyclinique among the poorer classes, the proportion of carcinoma to myoma was as 100 to 61; in his private practice among the wealthier, it was as 100 to 332.

2. The *local predisposing causes* are the following:—

Erosion of the cervix and protracted catarrh;
Repeated parturition.

The relation of *erosion and laceration of the cervix* to the development of carcinoma has been recently pointed out by Ruge and Veit and also by Breisky. We draw attention to this point specially, because the most important differential diagnosis is that between long-standing inflammation and commencing malignant disease. The possibility that the former may pass into the latter should always be kept in view.

Repeated parturition has an important influence. Carcinoma is much more frequent in multiparæ. Gusserow finds an average of 5·1 children to every case of carcinoma, which is a high average productivity. Whether this is due to the greater functional activity of the uterus or to the production of fissures with their resulting chronic inflammatory changes, is a more difficult question.

TABLE AND DIAGRAM SHOWING FREQUENCY OF CARCINOMA ACCORDING TO AGE OF PATIENT.

NUMBER OF CASES.

Out of 2270 cases
2 were under 20 years
81 ,, between 20 and 30 years.
476 ,, ,, 30 ,, 40 ,,
771 ,, ,, 40 ,, 50 ,,
600 ,, ,, 50 ,, 60 ,,
258 ,, ,, 60 ,, 70 ,,
82 ,, over 70 ,,
(Gusserow).

PERCENTAGE PROPORTION.

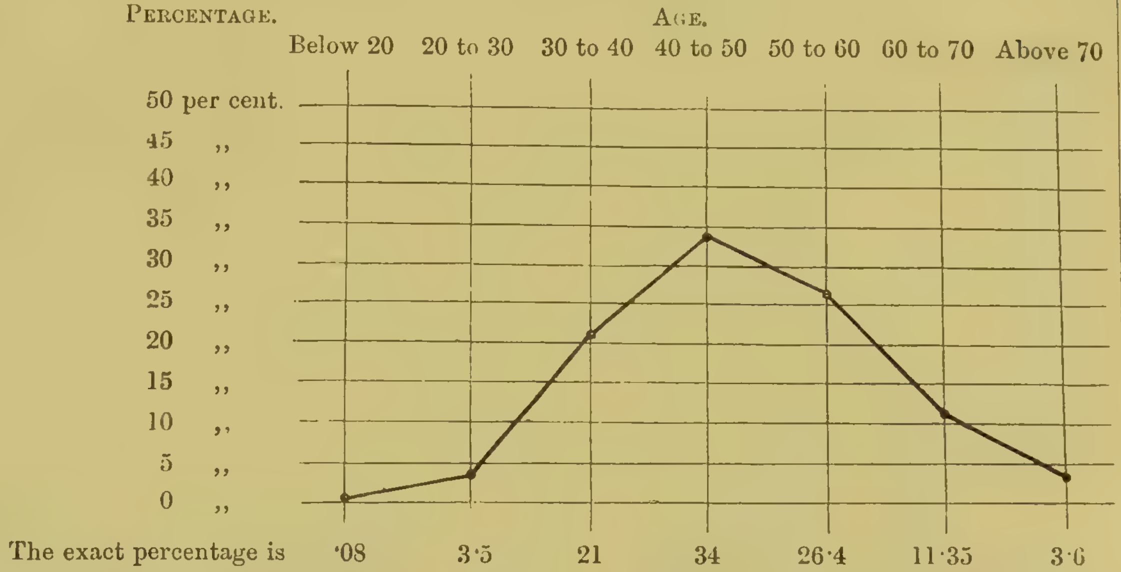


Fig. 277.

CHAPTER XXXIX.

CARCINOMA UTERI (OF CERVIX): SYMPTOMS AND DIAGNOSIS.

Literature.—See Literature of Chapters XXXVIII. and XL.

SYMPTOMS.

The *local* symptoms of carcinoma uteri are three;—

Hæmorrhage,
Offensive discharge,
Pain.

There are in addition a considerable number of *general* symptoms, which arise secondarily.

As a rule, however, no symptoms are present in the first stage, that is until ulceration sets in. In exceptional cases, when infiltration of the connective tissue or of the walls of the uterus has taken place at an early period, pain may be an early symptom; there is no pain so long as the disease is limited to the cervix. This entire absence of symptoms until the disease has already made considerable progress, is the reason of the great difficulty in ascertaining the period of its probable commencement. From the same cause, the patient does not seek relief till the possibility of eradicating the disease is much diminished.

LOCAL SYMPTOMS.

Hæmorrhage is usually the first symptom noticed by the patient. She observes that menstruation is more profuse than formerly.* This, when the disease occurs late in life, she attributes to approach of the menopause. In other cases, profuse hæmorrhage occurs irregularly between and independent of the menstrual periods.† Sometimes the hæmorrhage is noticed only after exertion (as straining at stool) or after coitus. Sometimes she states that "the menstrual flow never entirely ceases;" which means that the vaginal discharge is always tinged with blood. The explanation of hæmorrhage in these earlier stages is to be found in the vascularity of the stroma of the new formation. It is rich in delicate vessels which readily rupture. In the later stages, hæmorrhage is not a prominent symptom unless a large vessel be accidentally eaten into. Death from hæmorrhage is rare.

---

* Possibly, when the disease is extending along the mucous membrane of the cervix.

† Possibly, when the disease has begun in the substance of the cervix, but has ulcerated its way to the surface; or, later, in the case of large cauliflower excrescence suddenly broken down.

The *discharge* characteristic of carcinoma is not present until ulceration has occurred. In the papillary form of epithelioma* (cauliflower excrescence), there is a free discharge before the growth has begun to break down; this is of a watery character, has no odour, and is due simply to the transudation of serum. As soon, however, as ulceration occurs in any of the forms, there is a discharge containing the molecular debris of the breaking down tissue which gives it a characteristic and peculiarly offensive odour. In the rapidly growing forms (medullary) of carcinoma, there is an almost equally rapid molecular death of the newly formed tissue due to fatty degeneration of the epithelial cells. In epithelioma this discharge is less marked, because there is less necrosis of tissue; but in true carcinoma, especially in advanced stages, it is quite characteristic. In fact, a diagnosis can be made merely from the odour which hangs about the person. At first the discharge is yellowish white in colour, but afterwards from the decomposition of the fatty cells it becomes of a reddish brown; if there is hæmorrhage, it will be tinged with blood.

Pain is not such an important symptom as is usually supposed. Some cases run their whole course without the patient's complaining specially of pain. It is not present so long as the disease is limited to the cervix; hence it is of no use as a diagnostic of carcinoma of the cervix in its early stage, unless the cellular tissue has been at the same time involved. But as soon as the new growth has extended upwards to the body of the uterus or to the cellular tissue of the pelvis, pain is produced though pressure on or actual lesion of the terminations of the nerves. The character of the pain varies. It is "a dull gnawing pain localised in the pelvis or back," or "a sharp pain shooting through to the back or down the thighs to the knees;" this last is caused by simple pressure on the crural and sciatic nerves or, in the later stages, from affection of the cellular tissue of the nerve sheaths. Occasionally it is felt in the mammæ or other seats of uterine sympathetic pain. The intensity of the pain varies also in different cases; it is marked where this is more formation of new tissue and less ulceration, that is when there is more pressure on the nerve endings. Thus, if there has been much deposit between the uterus and the bladder accompanied with an increase of pain, we find that the pain diminishes when the mass breaks down and a vesico-vaginal fistula is formed. We may distinguish between pain due to the development of carcinoma, and that produced by the chronic peritonitis which accompanies it when the peritoneum becomes affected; the latter produces great sensitiveness of the abdominal walls to pressure, and a board-like rigidity from reflex spasm of the muscles.

---

* Though, as we have said, we have not at present a truly *pathological* classification of the different forms of carcinoma, it is convenient, *clinically*, to use the terms Epithelioma and true Carcinoma. By them we do not imply anything as to the origin of the disease. By epithelioma we understand those forms which begin more superficially, spread more slowly, and do not tend to involve the connective tissue.

GENERAL SYMPTOMS.

In addition to these local symptoms which are immediately due to the carcinomatous infiltration and degeneration, there are more general symptoms which arise secondarily.

First we mention *loss of flesh* and *general debility*. The patient may continue healthy and well-looking, in the early stages; sometimes, one is surprised to find that the disease is already well advanced in a patient who to outward appearance is in perfect health. But, sooner or later, the drain on the system produces great emaciation. The patient also has a careworn expression, partly from this loss of flesh and partly from the constant pain; from this expression alone, known as the "cancerous facies," the diagnosis may sometimes be made.

The wasting (marasmus) is occasioned not only by the drain of the new growth, but also by *disturbances* of the *digestive system* which arise in the course of the disease. Loss of appetite may amount to disinclination for food, and digestion is interfered with. This is produced at first sympathetically, as in other uterine disorders; but latterly it is due to gastric catarrh, constipation, the condition of the blood (anæmia and uræmia), and the unhealthiness of the atmosphere resulting from the offensive discharges.

There is, further, *painful micturition and defœcation* according to the extent to which the bladder and rectum are involved. The latter is always present, as the rectum, whenever it is distended, presses upon the carcinomatous growth. When fistulæ are produced, the urine and fæces pass per vaginam.

Pruritus vulvæ frequently results from the acrid and irritating discharge, and from the dribbling of the urine from a fistula. The *skin* acquires in the later stages a *dingy straw tint*, which when very marked is suggestive of jaundice. That disease may actually be present when there is secondary carcinoma of the liver, but this is rare. The colour is due to the anæmia, or (according to Barnes) to the absorption of decomposed fœcal matter (copræmia).

DIAGNOSIS.

As the patient does not seek advice till the carcinoma has begun to ulcerate, the physical signs have by that time become well marked and the diagnosis is easy.

On making a *vaginal examination*, the finger feels the enlarged, thickened, irregular, everted lips of the cervix spreading like a mushroom in the vagina (described by Malgaigne as "champignons cancéreux"). Sometimes a distinct tumour is present, the form of which is sufficiently indicated by the term cauliflower excrescence (see fig. 278). In other cases the finger feels an irregular ulcerated surface in the position of the cervix, soft and friable with hard and unyielding margins. The examining finger is stained with blood, and the odour of the discharge cannot fail to be recognised. If there is any doubt as to diagnosis, a fragment should be removed and examined microscopically. The appearance of a fibrous stroma with alveoli which contain irregular cells of an epithelial type with one or more large nuclei, will confirm the diagnosis of carcinoma.

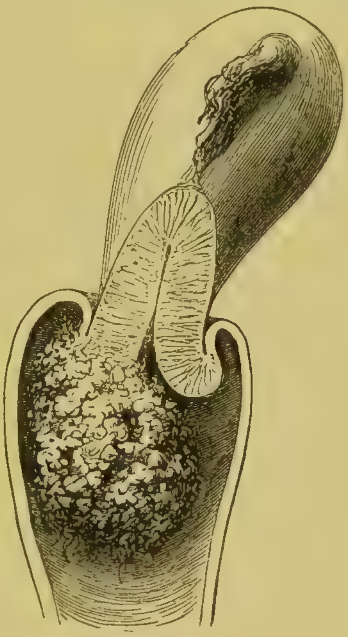


Fig. 278.
Cauliflower excrescence growing from the cervix uteri (Sir J. Y. Simpson).

The *speculum* need not be used for the recognition of carcinoma, except in its early stage or to ascertain more exactly the seat and extent of the growth. If the disease be far advanced and the diagnosis certain, the introduction of it causes unnecessary pain and hæmorrhage.

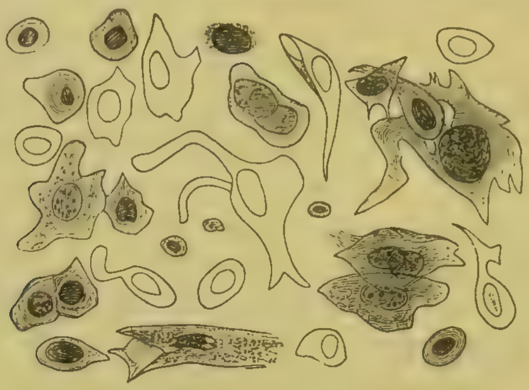


Fig. 279.

Scraping from carcinoma of the cervix, stained with logwood, $\frac{250}{1}$; drawn by S Delépine.

The *rectal examination* is valuable, and in these cases should always be carefully carried out. It gives us important information in two distinct classes of cases. First, in early carcinoma or in cases where there is a suspicion of commencing carcinoma, the cellular tissue of the pelvis should be carefully examined to ascertain whether any localised deposit or enlarged glands can be felt; this can be done most easily by the rectal examination If it is desirable to introduce two fingers into the rectum or if the examination causes much pain, the patient should be narcotised. Second, in cases of advanced carcinoma where the vaginal examination is difficult on account of the hæmorrhage and pain which it occasions, a more thorough examination can be made per rectum. The finger can reach higher up than per vaginam, and thus we can ascertain the extent of the carcinomatous deposit and the size and mobility of the uterus. The condition of the rectal mucous membrane itself is observed at the same time, to ascertain whether it is already involved in the disease. In some cases the rectal examination is the only one possible, as in the case of carcinoma vaginæ represented at fig. 275 where the deposit round the ostium vaginæ made the introduction of the finger impossible.

DIFFERENTIAL DIAGNOSIS.

The following are the most important lesions from which carcinoma is to be differentiated :—

Hypertrophy of the cervix, with induration and occluded follicles;
Papillary erosion, or ectropium, with cicatricial tissue;
Syphilitic ulceration, condylomata on the cervix;
Small fibroid in the cervix, sloughing polypi;
Retained portions of placenta or membranes;
Diphtheritic inflammation of the mucous membrane;
Sarcoma of the cervix.

As regards the first two of these, it is evident that carcinoma resembles them only at an early stage. But it is precisely at this stage that a correct diagnosis is all important for treatment. We should also remember (as Ruge and Veit have pointed out) that these conditions may be at once the result of chronic inflammation and the starting-point of malignant disease. The statement of the patient that the symptoms have existed for a long time, should not throw us off our guard. *In all* cases in which a patient *over forty years of age* seeks advice *with symptoms referable to the pelvis, a careful examination should be made.* We may thus accidentally discover carcinoma in an early stage, while still within the possibility of radical treatment. If the carcinomatous infiltration be general it cannot be distinguished, except by microscopical examination, from chronic induration. Spiegelberg proposed two tests: (1) the mobility of the mucous membrane over the indurated tissue below, which is lost when the disease is malignant; (2) when a sponge or laminaria tent is passed into the cervix, the infiltrated parts do not dilate like normal tissue. It is difficult to apply these tests practically: to pronounce on the mobility of the mucous membrane, requires a tactus eruditus such as few can claim; chronic induration, as well as malignant infiltration, prevents dilatation. In such cases, we must watch the further progress; and, if there is suspicion of carcinoma, there is no harm in excising a portion of the suspected part and submitting it to *microscopic investigation.* A careful examination per rectum of the pelvic cellular tissue should always be made as mentioned above.

A superficial ulcerating epithelioma might be mistaken for a simple erosion, but has *thickened infiltrated edges.* The latter may, however, pass into the former.

Condylomata on the cervix simulate epithelioma, but they disappear under appropriate treatment. Syphilitic ulceration produces sometimes deep excavation, even a rectal fistula. This at the first glance might be taken for carcinoma, but more careful examination and enquiry into the history of the case will remove all doubt.

Small myomata are more sharply defined than a carcinomatous nodule of the same size, because the surrounding tissue is not infiltrated.

When a small sub-mucous fibroid or a cervical polypus has ulcerated, it presents appearances similar to an ulcerating carcinomatous nodule. The former however is firmer and fragments cannot be broken off by the finger-nail, while the latter is friable and breaks down easily.

The possibility that carcinoma may be first noticed during the puerperium, should always be remembered. There should be no difficulty in diagnoscing between carcinoma of the cervix and a retained portion of placenta. If the finger be passed in, it will discover whether the suspected fungus-like mass be simply lying in the cervical canal or be springing from its walls. We have seen several cases of carcinoma in patients who were supposed to be having an abortion. In the case of carcinoma of the fundus, differential diagnosis is more difficult and will be discussed under that head.

Diphtheritic inflammation of the mucous membrane may easily be confounded with ulcerating carcinoma (Schrœder). The irregular swelling of the mucous membrane and the offensive discharge tinged with blood, which are present in diphtheritic inflammation, may be suggestive of carcinoma at the time ; but this superficial resemblance soon disappears.

Sarcoma of the cervix is a very rare condition. Sarcomatous tumours are softer and grow more rapidly than carcinomatous. A positive diagnosis can only be made after microscopical examination of scrapings taken from the tumour.

PROGNOSIS.

The prognosis in carcinoma is always very grave. The possibility of spontaneous cure is a disputed point. There is one apparently well authenticated case recorded by Habit.* Another is mentioned by Barnes,† in which there is some doubt as to the correctness of diagnosis. The prognosis as to the probable duration of life, will depend on the extent to which the disease has already advanced and the possibility of checking its progress or even extirpating it altogether by operative interference. We are not yet in a position to form an opinion upon the possibility of extirpation, because the operation for this purpose is of but recent date and statistics as to the occurrence of relapse cannot yet be gathered.

As regards the duration of disease if not interfered with, there is a slight difference of opinion. This may be explained by the variable period in the course of the disease at which the symptoms appear. Sir J. Y. Simpson gives the probable duration of life after the detection of the disease as from 2 to 2½ years; Gusserow and Schrœder give it as from 1 to 1½; while, according to Fordyce Barker, it is as long as 3 years and 8 months. The statistics of H. Arnott, drawn from 57 carefully observed cases, give the duration, after the first symptom (usually a flooding), of true cancer as 53·8 weeks; of epithelioma, 82·7 weeks. We may say therefore to the patient's friends that the disease will run a course of from one to two years. It is better not to tell the patient herself what her trouble is, though its serious nature should not be disguised.

---

* Sydenham Society's Year Book, 1864, page 401.

† Barnes, Diseases of Women ; London, 1878.

CAUSES OF DEATH.

The causes of death, arranged in the order of importance, are the following:—

Exhaustion,
Uraemia,
Peritonitis,
Septicœmia,
Hæmorrhage,
Venous thrombosis.

Exhaustion, under which we include *marasmus*, is the result partly of the drain on the system and partly of the inability to take food.

The importance of *uræmia* as a frequent cause of death has only recently been pointed out. According to Seyfert,* in the majority of cases death results from it. It is due to the compression of the ureters, as already described under pathology. It may be acute, accompanied by coma and convulsions; more generally it is chronic, and shows itself in the dullness of the patient, occasional headache, and decreasing sensibility to pain—which diminishes suffering as the disease approaches its termination.

Peritonitis is sometimes the cause of death, but not so frequently as one would suppose; the disease is prevented from extending generally to the peritoneum by the adhesions which are formed. When peritonitis occurs, it is localised and chronic; in some cases, however, a general peritonitis is set up which proves fatal. *Perforation* may take place from the sudden giving way of adhesions; the escape of the carcinomatous debris into the peritoneal cavity produces death from shock or septic peritonitis. The preparation shown at fig. 280 was taken from a patient in whom the immediate cause of death was *rupture of the uterus.* The case is reported and the preparation described by

---

* Säxinger, Prager med. Vierteljahrsschrift, Bd. I., S. 103.

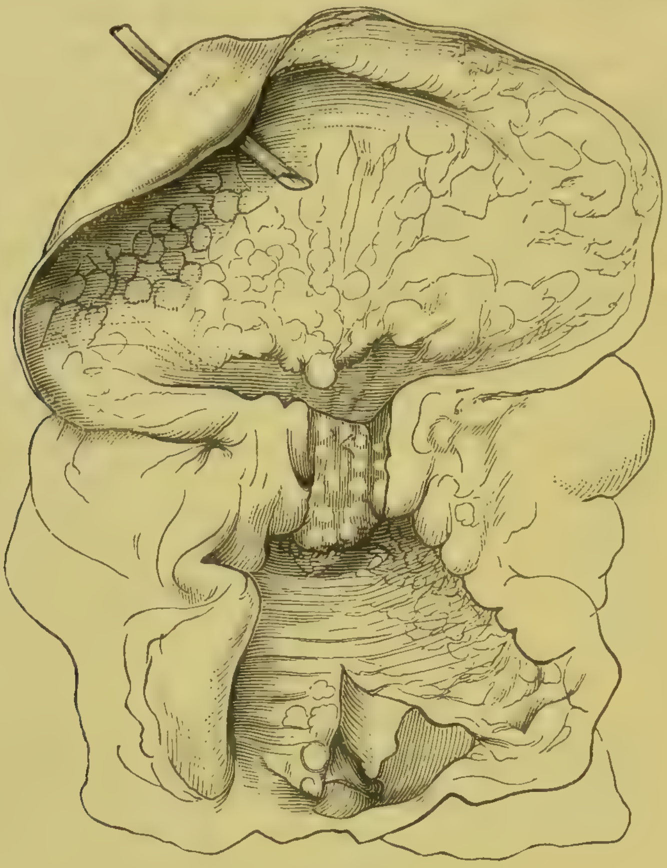


Fig. 280.

Carcinoma of the cervix leading to occlusion of os uteri, dilatation of uterus and perforation (A. R. Simpson). Uterus and vagina laid open; a bristle is passed through the perforation.

A. R. Simpson (op. cit., p. 276). There was carcinoma of the cervix which had contracted the lumen of the canal; the cavity of the uterus was expanded, the walls being thinned out; at the fundus 'was a small perforation about the size of a pea, with thin edges,' through which fluid had escaped and set up peritonitis which rapidly proved fatal.

Septicæmia suggests itself as a likely cause of death. We are familiar with it as produced in the puerperal condition: it is explained by the fact that, at that time, there is abundant means for absorption in the numerous lymphatics and the large veins which have been recently lacerated; hence, whenever septic matter is present, there is great risk of septicæmia. Similar conditions exist in carcinoma, during the progress of which the blood-vessels are eroded and their extremities bathed in putrid matter. Barnes has drawn special attention to this as a source of blood-poisoning; according to Eppinger's * observations its occurrence is rare, and this he ascribes to the diminution of the absorptive power of the eroded vessels.

Hæmorrhage is in very rare instances immediately fatal. As already pointed out, though it is important as an early symptom, it occurs less frequently and is less abundant as the disease advances. If a large vessel be suddenly opened into, a fatal hæmorrhage may follow.

Venous thrombosis, due to mechanical compression of the veins, sometimes occurs; and a clot may be detached producing embolism in the lungs. Fatty degeneration of the heart is, sometimes, also present.

---

* Prager med. Wochenschrift 1876. S. 210.

CHAPTER XL.

CARCINOMA UTERI (OF CERVIX): TREATMENT.

LITERATURE.

Barnes—Op. cit., p. 856. *Freund*—Samm. klin. Vorträge, Nr. 133; and Centralbl. f. Gyn., N. 12, 1878. *Gusserow*—Die Neubildungen etc., S. 203. *Hegar und Kaltenbach*—Die Operative Gynäkologie, S. 391. *Schrœder*—Charité Annalen: V. Jahrgang, S. 343. Zeitschrift für Geburtshülfe und Gynäkologie: B. III., S. 419; B. VI., Heft II., S. 218. *Simpson, A. R.*—Op. cit., p. 261. *Simpson, Sir J. Y.*—Op. cit., p. 170. *Sims, Marion*—The Treatment of Epithelioma of the cervix uteri: American Journ. of Obst., July 1879. *Thomas*—Op. cit., p. 591.

THE treatment of carcinoma ought to be regarded in two aspects: first, as treatment of *the symptoms;* second, as treatment of *the disease.* Again, the treatment of the disease may be either *palliative* or *radical.*

We need not discuss here the vexed question whether carcinoma is a constitutional or a local disease. It cannot be too strongly impressed on the student that, as far as our present experience goes, in attacking the disease itself he must rely upon *surgical* and not on *medical* treatment. Our aim ought to be the removal of the disease and not merely the alleviation of the symptoms. To remove it completely we must recognise it early. Up to the present time successful treatment has been a rare occurrence, because we have failed to recognise carcinoma in its commencing stages. The possibility of treating it successfully in the future will depend on the possibility of our recognising it in its commencement. Not less important than early recognition is complete removal and that without delay. In the uterus, more readily than in the mamma, does the carcinoma get beyond the reach of the operator. In carcinoma mammæ, we can excise not only the breast but also the axillary glands if these should be already implicated. But, in carcinoma uteri, as soon as the pelvic glands are involved the case is hopeless as regards a radical cure.

We shall consider, first, the treatment of the symptoms; because, in the majority of cases, when the patient comes under our notice, the disease itself has already got beyond our remedies.

TREATMENT OF SYMPTOMS.

These are hæmorrhage, offensive discharge, pain.

HÆMORRHAGE.

In the treatment of hæmorrhage, there are two points to be considered ; *first*, the instructions to be given to the patient ; and, *second*, the means which we can ourselves employ.

(1.) The patient is instructed to take the liquid extract of ergot in large doses whenever there is much hæmorrhage either during the menstrual period or independent of it. If she is subject to floodings, a friend might be taught how to give the ergotin solution hypodermically. Ice applied to the vagina and injections of cold water check hæmorrhage; a small piece of sponge or tampon of wadding, soaked in perchloride of iron, might be passed into the vagina if cold is not sufficient. The patient is recommended to avoid sexual intercourse, as this favours active congestion and in some cases is the cause of hæmorrhage.

(2.) The means at our own command are the following :—

Simple pressure, effected by complete and thorough plugging of the vagina ;

The use of styptics, caustics, or the actual cautery ;

The removal of diseased tissue by the curette or other means.

The plugging of the vagina should be done whenever we are called in on account of profuse hæmorrhage. The packing is carefully done with pledgets of lint or cotton wadding (with string attached) soaked in carbolic oil ; the speculum is introduced carefully and not carried high up.

Of styptics, the best are the perchloride and the pernitrate of iron. Sir J. Y. Simpson recommended a saturated solution of the perchloride in glycerine. A pledget soaked in either of these is introduced, and placed so as to be in contact with the bleeding surface ; and the rest of the vagina is packed, as above described, with the pledgets steeped in carbolic oil. The perchloride should be used with great caution in cases of advanced ulceration, as we have seen it corrode into the tissue so as reach the peritoneum and produce peritonitis. The use of caustics, cautery, and curette, will be considered under operative treatment.

OFFENSIVE DISCHARGE.

This is best treated by astringent and antiseptic injections. These should be used frequently, as it is important to keep down the unpleasant odour and make the patient's surroundings as comfortable as possible. If the discharge be plentiful and not very offensive, as in the cauliflower excrescence, the indication is more for the use of astringents like sulphate of alumina and iron (4 grains to the oz.). Tannin or sulphate of zinc can also be used, and it is well to change the astringent occasionally. If there is much necrosis of tissue with very offensive discharge, carbolized water (1 to 50) is required.

Acetate of lead (ʒ1 to ℥20) is recommended by Barnes. Solution of bromine (1 of the B.P. solution to 3 of water) is a good disinfectant, but its odour is disagreeable. Condy's fluid is largely used, but it is only deodorant not disinfectant. The skin round the external genitals should in all cases be protected from the acrid discharges, as the irritation is a source of discomfort. A lotion of equal parts of olive oil and glycerine or of olive oil and lime water, applied after each vaginal injection, serves this purpose well.

PAIN.

This can only be effectually relieved by some preparation of opium; it is well to delay the habitual use of this remedy as long as possible, as it interferes with digestion and nutrition. It may be given as a morphia suppository ($\frac{1}{4}$ of a grain in each) per rectum, or as the liquor morphiæ hydrochloratis by the mouth. We obtain its action most surely and quickly and with the least disturbance of the digestive system by giving it hypodermically. It is desirable to change the narcotic, as even opium gradually loses its effect; the hydrate of chloral, in 20 grain doses, may be used as a substitute. Various local anodynes have been suggested, but are of little use.

Attention to the *general condition* of the patient is very important. The three main points are to give a sufficient quantity of nutritious and easily digestible food, to keep the bowels regular, and to have the atmosphere healthy and the surroundings cheerful. Food should be given in small quantities and frequently; milk, eggs and beef-tea should be substituted for more solid food as soon as digestion fails. In the later stages, the bowels should be evacuated by enemata rather than by purgative medicines. The room should be well ventilated by day and night, and the vaginal injections repeated frequently. Gusserow recommends that during the night a piece of waterproof sheeting be tied round the patient's waist to keep away the disagreeable odour.

TREATMENT OF THE DISEASE

As before stated, our aim here is extirpation. If complete removal be possible, carcinoma will be no longer the incurable disease which haunts the mind of the patient and baffles the skill of the practitioner. The principles of treatment can be best understood by considering the progress of the disease as consisting of three stages: (1) when the disease is present as a germ infiltrating healthy tissue; (2) when the germ has developed into a tissue having the typical carcinomatous structure; (3) when this newly-formed tissue breaks down. The accompanying diagram (fig. 281) illustrates this progress. The three stages are represented by three zones.

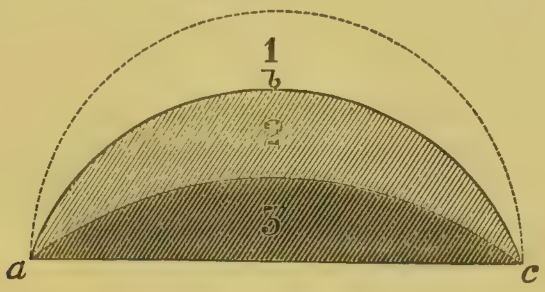


Fig. 281.

Diagram to illustrate the spreading of Carcinoma. 1 Healthy tissue infiltrated with germs of Carcinoma; 2 Carcinomatous tissue fully developed; 3 Carcinomatous tissue breaking down.

The extent of zone 1 is not well defined, for we have no means, unless with the microscope, of ascertaining how far the surrounding tissue is infiltrated. The area of zone 2 is more definite; the line *a b c* is well marked, for the carcinomatous tissue when fully formed has characteristics by which it can be recognised from the surrounding healthy tissue by touch or sight. Zone 3 represents the third stage, in which the immediate danger to the patient lies. It is not the *formation* of the carcinomatous tissue which is dangerous, but its *ulceration* with accompanying hæmorrhage and exhausting discharge.

From these facts we deduce the following principles of treatment. *First*, to effect radical cure we must remove zone 1, as well as zones 2 and 3; *i.e.*, we must remove not only the tissue which is evidently carcinomatous, but also all the surrounding tissue which may contain germs of the disease. Sometimes by a chance the operator has done this through keeping well clear of the evidently diseased part, and thus we can explain the few recorded cases of cure. *Second*, we may anticipate the natural process of breaking down, with its accompanying exhausting results and risks of a fatal hæmorrhage, by destroying the newly formed carcinomatous tissue as far as it is recognisable. We shall thus save the patient from the effects of the disease until zone 1 has passed into the condition of zone 2 and is beginning to break down. Thus we explain the temporary benefit (for a period measurable by months) derived from the partial excision of the new growth. *Third,* the application of caustics alone may effect the destruction of area 2; but we are not so sure that we are removing the *whole* up to line *a b c*, as we are when we are using the knife or other cutting instrument. The latter means is preferable because we can make certain that we have reached this line in all cases where it is attainable by operative means. *Fourth,* the use of the knife and the application of caustic to the raw surface will, where the disease has spread far, be more effectual than the use of the knife alone; the caustic will now without doubt operate on the area of zone 1 and destroy so far the germs of the disease.

There are four methods of operative treatment.

1. Application of caustics,
2. Scraping out of diseased tissues,
3. Amputation of the cervix,
4. Excision of the uterus.

APPLICATION OF CAUSTICS.

This should scarcely come under the head of treatment of the disease. All that we can hope for in the application of caustics is merely a superficial destruction of the growth and consequent temporary alleviation of the distressing symptoms. The caustics which we may use are the following. *Strong nitric acid* is applied with a dossil of lint: wash and, to prevent the acid from running, carefully dry the diseased surface before the application; wash again afterwards to remove superfluous acid. An alcoholic *solution of Bromine* (1 to 5) has been recommended by Routh * and Wynn Williams†: cotton wadding soaked in it is applied to the diseased part to produce a slough, and the rest of the vagina protected by wadding wet with bicarbonate of soda. Numerous other caustics have been tried.

The results of this method are only temporary. The superficial layers of the growth are destroyed while the hæmorrhage and discharge cease for a time. Cicatricial contraction takes place on the surface, but the hard infiltration can be felt extending beyond. According to Campbell de Morgan,‡ the superficial application of caustics acts as an irritant producing increased growth of the new formation; so that when they are used they must be applied thoroughly.

---

* British Medical Journal, February and March 1880.

† London Obstetrical Transactions, vol. xii., p. 249.

‡ The origin of Cancer considered with reference to the treatment of the disease, 1872.

SCRAPING OUT OF DISEASED TISSUE.

We have recourse to this means of treatment (1) in cases in which the disease is not of a form suitable for amputation—when it does not form a pediculated mass but is spreading along the mucous membrane of the vagina, (2) in cases which are too far advanced for amputation of the cervix. This method is good and safe in principle, because the carcinomatous tissue is soft and friable compared with the surrounding connective tissue and can be therefore easily scraped away.

The means which we employ are the curette or the sharp spoon. Sir J. Y. Simpson used to scrape out the diseased tissue with the finger-nail or the curette. The sharp spoon introduced by Simon* is the most efficient instrument: it should be used with short firm strokes, and the raw surface examined from time to time with the finger to feel whether all the hard nodules have been removed. After the scraping has been thoroughly carried out, the surface is burned by the actual cautery and the vagina tamponed to prevent hæmorrhage. The results of this method are more satisfactory than those which follow the application of caustic alone; they depend entirely on the thoroughness with which the scraping has been done.

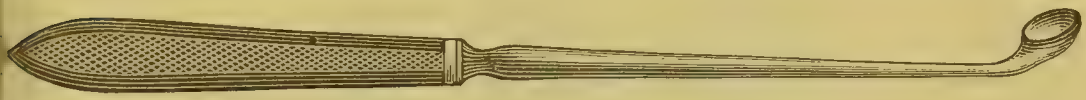


Fig. 282.
Simon's sharp spoon.

AMPUTATION OF THE CERVIX.

This operation is called for by two sets of circumstances: (a) when the disease is as yet limited to the cervix and there is a distinct line of demarcation above, so that in operating we can cut through healthy tissues; (b) when it has spread so far that although we cannot operate upon healthy tissue, we are yet justified in removing as far as possible the projecting mass.

The means of amputation are the following:—

Ecraseur, or galvano-cautery;
Knife and scissors, followed by ligature or caustics.

I. Ecraseur, or Galvano-Cautery.

Relative advantages. Both of these possess the advantages that they are easy of application and cause less hæmorrhage than the knife, although with the latter we can follow more certainly the line of demarcation. The ecraseur has the advantage that it is easily portable, requires no preparation, and is always ready when wanted. On the other hand, there is danger that the peritoneum of the pouch of Douglas or of the bladder may be lacerated by the chain. The galvano-cautery is inconvenient to carry about and s

---

* Berlin. Beiträg. zur Geburt. u. Gyn., 1872, Bd. I., p. 17.

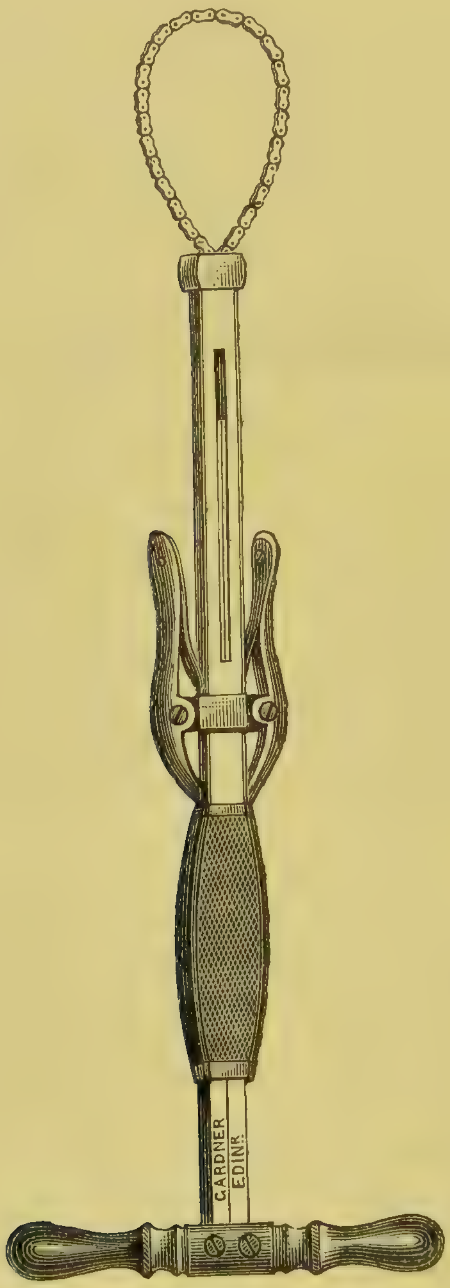


Fig. 283.

Ordinary chain ecraseur. By compressing the small side handles, the chain is allowed to run out freely. It is drawn in by a pumping motion of the large cross-handle.

not always ready when wanted, but has the advantage that we do not need to draw down the uterus to apply it; in all cases of operation upon the cervix for carcinoma, the less traction that is made upon the uterus the safer for the patient. As the ordinary ecraseur (fig. 283) has the chain in a line with the handle, the cervix must be drawn down to the vulva for the working of the instrument. This difficulty is obviated in the curved instrument, and in the wire ecraseur devised by Sir J. Y. Simpson (fig. 284). The galvano-cautery not only amputates but, at the same time, cauterises the stump; this is a questionable advantage as, though it may diminish the probability of hæmorrhage, it prevents us from examining whether all the diseased tissue has been removed.

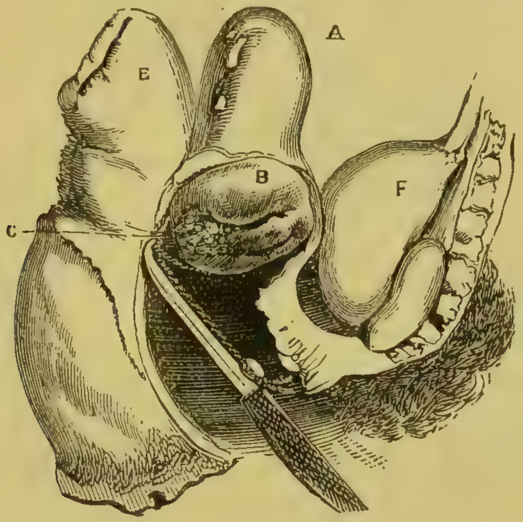


Fig. 284.

Wire ecraseur applied to cervix uteri *B*; the uterus *A* is not dragged down; *E* Rectum; *F* Bladder; ecraseur relatively too small (Sir J. Y. Simpson).

Mode of employment. Put the patient under chloroform. If the curved ecraseur or the galvano-caustic wire be used, place the patient semi-prone; only one assistant is necessary — to hold the Sims speculum. If the straight ecraseur is used or it is desirable to have the parts well exposed, the lithotomy posture is better; the two assistants who hold the legs can at the same time draw aside the labia with retractors, while a third draws back the posterior vaginal wall and perineum with the Sims' speculum. Now lay hold of the cervix or tumour with the volsella, if necessary draw it down to the vulvar orifice. Place the wire or chain round the cervix or the pedicle of the carcinomatous mass (fig. 285), as far above the limits of the disease as possible, so as to cut through healthy tissue, but not above the line of reflection of the mucous membrane of the posterior fornix upon the vaginal portion lest it should cut into the pouch of Douglas. After the ecraseur has begun to crush the tissues, *work it slowly*—shortening the loop at the rate of one notch in every twenty to thirty seconds.

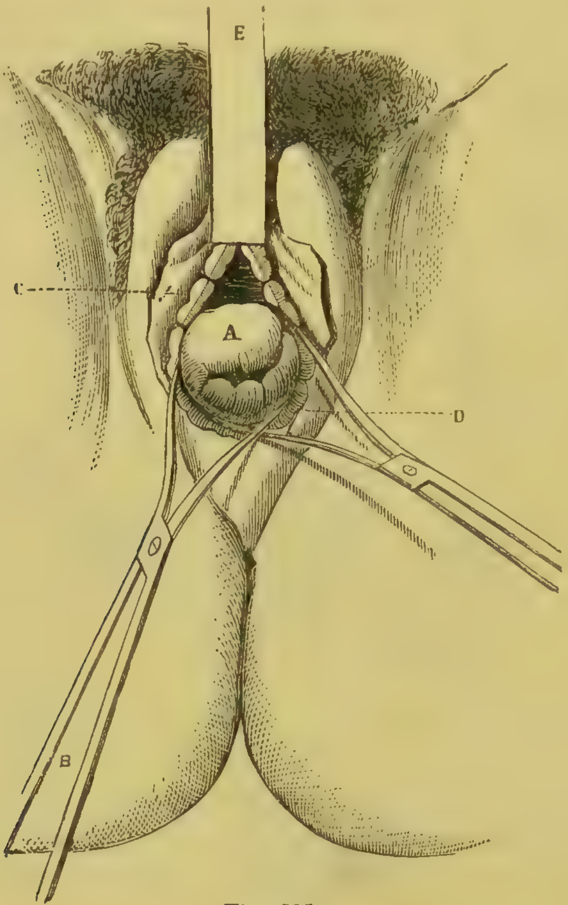


Fig. 285.

Straight ecraseur in position. *A* cervix drawn down to vulva by Museux's forceps; *C D* chain; *E* stem of ecraseur (Chassaignac).

In using the galvano-caustic wire place it in position cold, tighten it up so as to constrict the cervix, and then make the current. To prevent slipping of the wire, Thomas has devised forceps with shoulders, which he uses in place of volsella. Byrne of Brooklyn, who has had a large experience with the galvano-cautery, has pointed out that if gradual traction be made on the cervix during the action of the wire the result will be a funnel-shaped amputation; by this means more of the cervix will be removed. *Tighten the wire gradually*, so as to burn through—not cut—the tissue. After amputation, examine the surface of the stump. If there is much hæmorrhage, apply a styptic to the stump directly or on a pledget of cotton wadding, and pack the vagina with carbolised lint or wadding; this packing should not be discarded for a week or ten days, as the great after-danger is hæmorrhage.

The results of this method of amputation, which is recommended by Barnes, Byrne of Brooklyn, A. R. Simpson, Thomas, and others, are so far satisfactory. Cases of complete eradication of the disease are extremely rare, and therefore the one recorded by Sir J. Y. Simpson * has a peculiar interest. He removed the cauliflower excresence seen at fig. 286—from a patient who was much reduced by the hæmorrhage and discharge. Eighteen years after the operation she was still perfectly healthy, had borne five children, and had had no return of the carcinomatous growth. The diagnosis was confirmed by the microscopical examination of the tumour by Goodsir and Reid who found it to have the structure of an epithelioma. This result is only to be accounted for on the supposition that, by a happy accident, the extent of the disease was so limited that the amputation could be made through healthy tissue. In two other cases of amputation for cancroid disease, the life of the patient was prolonged for four years after the operation; death was due in one case to acute diarrhœa, in the other to the reappearance of the disease in the mesenteric glands. Even this result is exceptionally

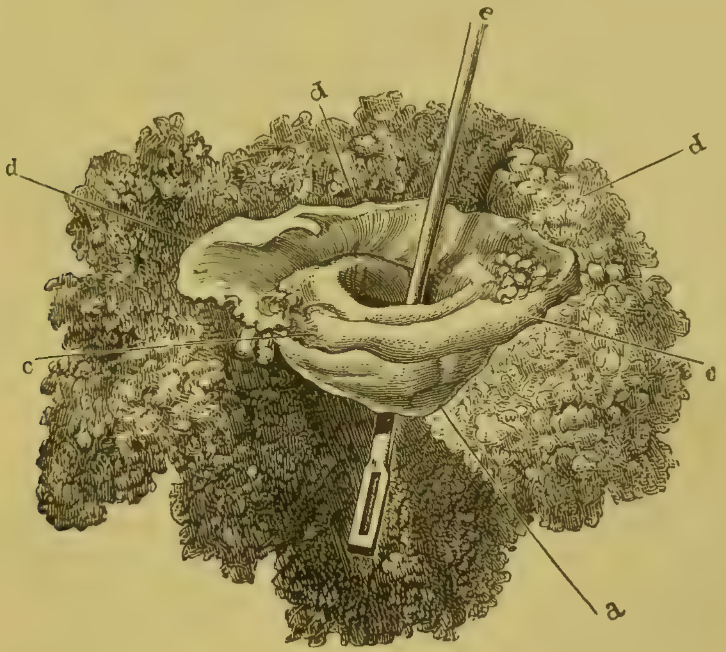


Fig. 286.

Cervix uteri amputated for cauliflower excrescence of the posterior lip. *a* healthy anterior lip, *c c* base of anterior lip. *d d d* portion of healthy vaginal mucous membrane removed along with the cervix, *e* rod passed through cervical canal (Sir J. Y. Simpson).

* Simpson—Diseases of Women, 1872, p. 180.

good; more frequently it is only a matter of months till the infiltration, which was not removed on amputation, developes into fully formed carcinomatous tissue.

II. Knife and Scissors. The advantage claimed for this method of operating is that it allows the operator to follow the line of demarcation between the diseased and the healthy tissues; if in the course of the amputation he finds the carcinomatous new formation extending higher up than he anticipated, he can remove as much more of the suspected part as may be necessary.

There are disadvantages in stitching up the wound so as to produce union by first intention. We must save enough mucous membrane to close in the wound, which would be cut away were we to leave the wound to granulate; and in this, diseased tissue may be left. Farther, in the wound itself, germs of the disease may be present which would be destroyed by the subsequent application of caustic.

As examples of amputation by the knife and closure of the wound by sutures, we shall describe the method adopted by Schrœder of Berlin. According to the extent of tissue to be removed, he performs either (*a*) amputation of the vaginal portion, or (*b*) supra-vaginal excision of the whole cervix.

A. *Amputation of the vaginal portion.* The cervix is divided on both sides with the scissors so that distinct anterior and posterior lips are produced. A wedge shaped portion is excised out of each of these (fig. 163) and the flaps stitched together. The lateral incisions in the cervix are then closed by sutures.

B. *Supravaginal excision of the whole cervix.* 1. The cervix having been drawn down with the volsella, the knife is carried through the vaginal mucous membrane of the *anterior fornix* round the base of the anterior lip into the cellular tissues below. The bladder is easily separated from the cervix almost as far as the utero-vesical pouch of peritoneum, and retracts upwards carrying the ureters with it.

2. The cervix is now carried forwards; and the mucous membrane of the *posterior fornix*, which is thus exposed, is incised in a similar way, the ends of this incision being made continuous with those of that made in the anterior fornix. The peritoneum of the pouch of Douglas is liable to injury, but this accident is not of importance. In cases where the posterior lip must be divided high up, it is better to cut into the pouch and remove the peritoneal covering along with the portion amputated.

3. The clearing of the cervix from the cellular tissue above the *lateral fornices* is more difficult, on account of the firmness of the con-

nective tissue and the presence of large branches of the uterine artery which enter at the sides. The scissors are useful here, and any bleeding points must be ligatured.

4. The cervix being thus made free all round, the knife is carried through its anterior wall at the desired height, *till* the *cervical canal is opened into.* The anterior vaginal wall is stitched to the anterior wall of the cervix (fig. 287). This prevents retraction of the cervix while the posterior wall is cut through and the amputation thus completed. The posterior vaginal wall is now stitched to the posterior lip of the cervix. The ends of the wound in the lateral fornices are closed with sutures which, if placed deeply, also control hæmorrhage. As the ureters retract, they are not in danger of being caught in the ligatures.

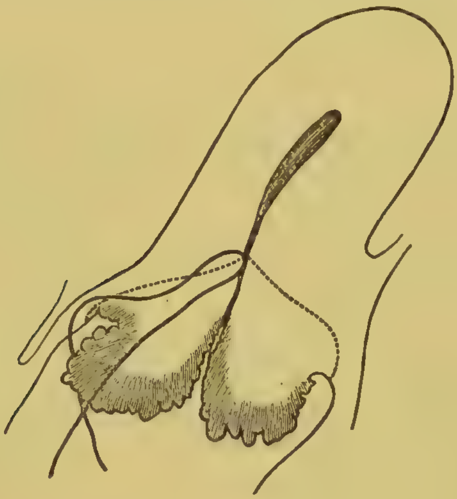


Fig. 287.

Line of incision and position of sutures in the supra-vaginal amputation of the cervix (Schrœder).

As regards the operation itself, Schrœder's results show that it is not a very serious one; of thirty-seven cases, four succumbed to the operation; one from hæmorrhage, one from phlegmon, and two from peritonitis. As regards the cure of the disease, the report is not so favourable. Of nineteen cases of which a definite report is given, thirteen had a recurrence of the disease at varying periods of which the average is four and a half months. In three, no recurrence had been observed within a period of eighteen, nine, and eight months respectively. The report of the condition of the other three, in which there was no recurrence, is made at too short a period after the operation to justify any deduction from it.

III. With the knife and scissors followed by the application of caustics. This is the method recommended by Marion Sims for the treatment of epithelioma of the cervix uteri. The steps in the operation are the following.

1. The epitheliomatous mass is broken down and removed with the curette, or cut away with the scissors if it is of a sufficiently firm consistence. It is not merely removed as far as its base (dotted line *a*, fig. 288), but the bed of the tumour is exsected with the knife and scissors or scraped out with the curette as far as diseased tissue is present (dotted line *b*, fig. 288).

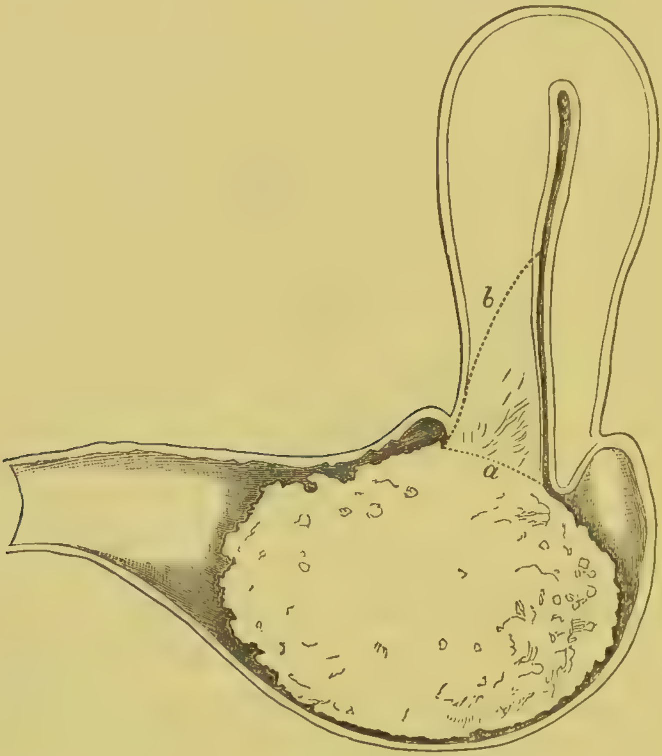


Fig. 288.

Excision of epithelioma of the cervix (Marion Sims). For letters see text.

2. The cavity thus produced is cleaned out with sponges, and examined with the finger to ascertain that all indurated structure has been removed.

3. The edges of the cavernous opening are trimmed. The parts are sponged quite dry, and the cavity plugged with cotton-wool squeezed almost dry out of either of the following styptic solutions; liquor ferri subsulphatis (1 part to 2 of water), or solution of carbolic (1 to 40) saturated with pulverised alum (1 to 12). The upper third of the vagina is packed with the same material, and the rest with cotton wool soaked in carbolic solution.

4. After an interval of five days, this plug is removed and the caustic introduced. Pledgets of cotton wadding soaked in a strong solution of chloride of zinc (ʒ v to ℥ i) and wrung dry, are packed into the scraped out cavity; the upper part of the vagina is tamponed with wadding soaked in a solution of bicarbonate of soda. Morphia is given hypodermically to relieve the intense pain produced by the action of the chloride.

5. After another interval of five days, the cotton wool containing the caustic is removed. A cup-shaped greyish slough will be found under it and is easily taken away. The granulating surface beneath will cicatrize in a fortnight.

The results of this method of operating are said by Marion Sims to be more satisfactory than those which follow from the use of the knife with healing by the first intention. He mentions one case in which he removed an epithelioma of the anterior lip (represented in fig. 288) the size of a Sicily orange. A year afterwards, the operation had to be repeated to remove a similar tumour from the posterior lip. Five years after this the patient was still in good health, though smaller growths had been removed in the interval.

We are not as yet in a position to decide which of these three methods of amputation is the best. The supra-vaginal amputation of Schrœder and the method of Marion Sims, enable us to remove more diseased tissue than the infra-vaginal amputation does.

EXCISION OF THE WHOLE UTERUS.

To Freund, formerly of Breslau, is due the credit of having first thought out and carried into execution a method by which the whole uterus can be removed. This method has increased the possibility of a radical cure of malignant disease of the uterus, though the number of cases suitable for extirpation is more limited than we should have supposed. The uterus alone can be removed by it, not the glands or connective tissue in the pelvis to which the disease in the majority of cases soon spreads. But when the disease has originated in the body of the uterus, or beginning at the cervix has extended upwards into the uterus rather than into the vagina or the connective tissue, the *extirpation of the uterus* holds out the prospect of a radical cure. This may be done *A*. By abdominal incision,

B. Through the vagina.

A. BY ABDOMINAL INCISION (Freund's method). The following are the steps in the operation. (As a preliminary in the operation referred to in the note,* the cervix was stitched to check hœmorrhage from the cavity of the uterus.) The vagina is thoroughly washed with carbolised water, and the most careful antiseptic precautions are observed. The bladder is emptied, and the catheter left in it as a guide to its position.

1. An incision is made in the abdomen in the middle line extending downwards to the symphysis pubis and, unless the abdominal walls are unusually lax, the recti are partially divided on each side at their insertion into the pubis. The peritoneal cavity having been opened into, the intestines are drawn up out of the pelvis; if there is not room for them in the upper part of the abdomen, they are brought out and covered with a cloth soaked in warm carbolised water. The uterus is laid hold of with forceps, of which Freund has devised a special form, and drawn upwards out of the pelvis.

2. The broad ligament is ligatured on both sides in three portions as follows. The uterus being drawn over to the opposite side to make the ligament tense, a needle armed with a double silk suture (fig. 289, 1) is passed from behind through the ovarian ligament; the end 2 of this thread is carried through the broad ligament just below its free margin; thus loop I. is formed, which when tied in front controls the *ovarian artery*. The lower end 3 is passed through the round

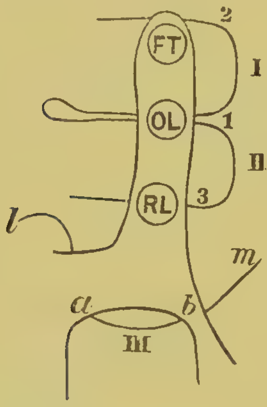


Fig. 289.

Vertical section through base of right broad ligament to show the position of the ligatures in Freund's extirpation of the uterus. The posterior aspect of the broad ligament is to the right. *FT* Fallopian tube; *OL* ovarian ligament; *RL* round ligament. The end *m* of ligature III. has not yet been carried through round ligament. For other letters see text.

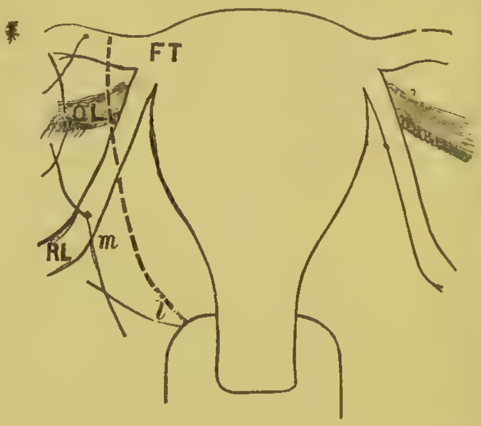


Fig. 290.

Uterus seen from the front. The ligatures shown only on the right side to correspond with figure 289; they are drawn through but not tightened. The dotted line is line of amputation. For letters see fig. 289 and text.

---

* In a case in which we saw Freund operate for Sarcoma uteri; the operation lasted 2½ hours. The patient made a good recovery.—A. H. B.

ligament and thus loop II. is formed, which when tied controls the *pampiniform plexus.*

The same is done upon the opposite side; the threads are not yet cut away, but drawn upwards by assistants.

The ligature III. dips into the fornix vaginæ so as to control the uterine arteries. It is passed from the vagina on a curved needle sheathed in a trocar. Guided by the hand in the vagina, the needle is made to pierce the lateral fornix (at *a*); a piece of cork pressed against the point facilitates penetration. The free end *l* of this double thread is laid hold of and held while the needle is withdrawn and, running on the thread, carries it through the lateral fornix (at *b*). The thread is then cut at *m* beyond the eye of the needle, so that the needle still threaded can be used to place a similar ligature in the lateral fornix of the opposite side. The end *m* is carried through the round ligament at the same point as 3, so as to form the ligature III. which controls the *uterine artery.* It is important that it should include but a small portion of the vaginal roof, so as to compress the artery more securely.

3. The uterus is now excised. The knife is carried through the utero-vesical pouch between the cervix and the bladder, of which latter the position is defined by the catheter. The free edge of the divided peritoneum, resting on the bladder, is fixed to the underlying tissue by a fine silk ligature. The peritoneum of the pouch of Douglas is now cut through at a lower level, and the free margin fixed in a similar manner with a fine silk thread. The cellular tissue underneath the peritoneal wound, before and behind the uterus, is separated *with the finger;* then the vaginal mucous membrane is divided in the anterior and posterior fornices with the knife passed in from the vagina. The uterus is thus free before and behind; and, the broad ligaments being cut through with the scissors internal to the three ligatures (fig. 290), the whole organ is removed.

4. The ends of the six ligatures are brought down through the wound in the roof of the vagina. (Formerly, Freund stitched this wound carefully up; the ligatures referred to above as placed through the margin of the peritoneum—before on the bladder and behind in the pouch of Douglas—were used to bring the peritoneal edges of the wound together.) A T-shaped drainage tube, kept in its place by a catgut suture, is laid in the wound. Any bleeding points in the margins of the wound are secured. The abdominal incision is closed; the peritoneum with fine silk thread, the muscular layer with silver wire, and the skin with fine silk sutures.

The results of this method of extirpation (as given by Hegar and

Kaltenbach—loc. cit. S. 408) are that, of 89 cases of completed operation, 26 recovered. The mortality of this operation has thus been about 71 per cent.

B. Extirpation from the Vagina. The following is the method adopted by Schrœder of Berlin.*

1. The uterus being firmly drawn down to the vulva, the cervix is separated from the bladder as in the supra-vaginal amputation but the peritoneum is not cut into. The mucous membrane of the posterior fornix is incised, and the cervix freed all round.

2. The pouch of Douglas is opened into, and two fingers of the left hand passed in over the fundus uteri into the vesico-uterine pouch. By cutting down through the wound in front of the cervix upon these fingers, the peritoneum is divided anteriorly.

3. The uterus, being thus freed before and behind, is retroflexed on itself so that the fundus is forced through the wound in the posterior fornix. This was done with comparative ease in the case observed; but where the uterus is enlarged or of a firm consistence or where the vagina is small, it can only be done with great difficulty; it is facilitated by laying hold of the fundus with forceps.

4. A needle armed with a double thread, is made to transfix the broad ligament which is ligatured in two portions and an additional ligature is put round the whole. This is done on each side. It is not difficult if the ovaries and Fallopian tubes are not to be removed, as the stumps are sufficiently long for the application of the ligatures; but if they are cut away, the ligatures are apt to slip.

5. The uterus is cut away; and the pedicles examined for bleeding points, which must be secured.

6. Each pedicle is brought into the wound in the roof of the vagina, and kept in position by a suture which is passed through the edge of the wound in the anterior fornix, through the pedicle above the ligatures, and then through the edge of the wound in the posterior fornix. This also brings together the margins of the wound at each side, and the ends of the wound external to them are closed. A T-shaped drainage tube is passed between the stumps into the peritoneal cavity. The vagina is packed with salicyllic wool and the end of the drainage tube wrapped round with the same. Should the temperature rise or the discharge become fœtid, the pelvic cavity is washed out with carbolised water. The sutures are removed after an interval of from two to three weeks.

---

* In a case in which we saw Schrœder operate for carcinoma uteri; the operation lasted half-an-hour. The patient made a good recovery. A. H. B.

The results of this operation are as follows. Schrœder has operated in eight cases (one of these was performed by his assistant), and in one only did the patient die; the death resulted from internal hæmorrhage caused by the rupture of a vessel in the broad ligament. The other seven made a good recovery. As regards the extirpation of the disease, sufficient time has not elapsed to ascertain whether or not it will return. The total results are (according to Hegar and Kaltenbach) that, of 29 completed operations, 21 recovered. The mortality has been therefore only 27·6 per cent., which contrasts favourably with that in Extirpation by Abdominal Incision (71 per cent).

CHAPTER XLI.

CARCINOMA OF THE BODY OF THE UTERUS.

LITERATURE.

Breisky and Eppinger—Prager med. Wochenschrift, 1877, S. 78. *Gusserow*—Neubildungen des Uterus : Stuttgart, 1878, S. 222. *Schrœder*—Op. cit., S. 295. *Simpson, Sir J. Y.*—Selected Obstetrical and Gynecological Memoirs, edited by Dr Watt Black, p. 769. *Veit*—Zeitschrift. für Geburts. und Gyn., Bd. I., S. 467.

PATHOLOGY AND ETIOLOGY.

Carcinoma affects the body of the uterus much more rarely than the cervix ; in only 13 out of 686 cases of uterine cancer, that is in rather less than 2 per cent, was the disease situated in the body of the uterus (Schrœder).

Its rarity is apparent from the fact that Gusserow, after a careful survey of the whole literature, has collected but 80 cases.

As in the cervix, the disease originates either in the substance of the walls of the uterus or in the mucous membrane. In the former case, it begins as localised nodules which grow rapidly and produce bulging of the mucous membrane or of the peritoneal coat but do not tend to ulcerate. When in the mucous membrane it causes a uniform swelling or, more usually, projects in polypoidal masses (fig. 291).

By Eppinger and Ruge the disease has been directly traced to the epithelium of the uterine glands ; these first hypertrophy, and then their proliferating epithelium passes into carcinomatous epithelial cells. The new-formation ulcerates, so that the wall of the uterus becomes converted into an excavated surface with a hard base. Adhesions rapidly form with neighbouring organs, while secondary deposits may develope in the peritoneal cavity.

As to *Etiology*, what has been said of carcinoma of the cervix applies here with two additional facts. (1) The maximum number of cases is between 50 and 60 years, a decade later than in the cases of carcinoma of the cervix (*v.* fig. 277). Out of 34 cases, 23 occurred during these years (Pichot). (2) A surprisingly large proportion of the cases are in nulliparæ (Schrœder).

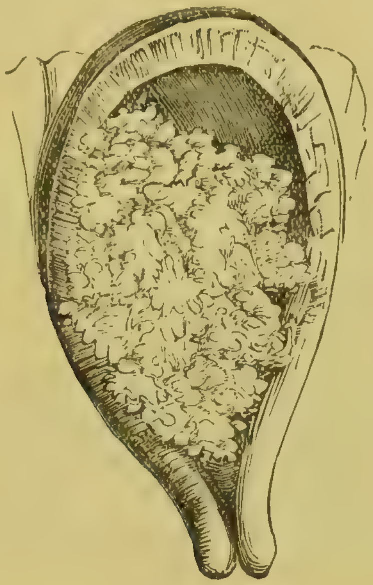


Fig. 291.

Carcinoma of the body of the uterus. The uterine cavity is increased in size but the cervix is undilated (Sir J. Y. Simpson).

SYMPTOMS AND DIAGNOSIS.

Again as in carcinoma of the cervix, the symptoms are pain, hæmorrhage, and fœtid discharge. 1. Pain, in contrast with carcinoma of the cervix, is always an early symptom. It occurs periodically; "slight and intermittent, perhaps, at first, but soon reaching a high pitch of intensity, at which it continues for an hour or two, and then gradually subsides" (Sir J. Y. Simpson). 2. *Hæmorrhage* is also present at an early stage; it takes the form of profuse menorrhagia, because the mucous membrane from which the menstrual flow takes place is diseased. 3. *The Discharge* is usually profuse and becomes after a time fœtid. Sometimes it is watery and not offensive; in rare cases is it altogether absent.

On vaginal examination, the cervix is found to be either normal or dilated. The uterus is enlarged, and may be freely movable or may be fixed by adhesions. The sound shows the cavity to be enlarged and may recognise irregularity of the mucous membrane; its introduction is followed by hæmorrhage. The condition of the mucous membrane is more precisely ascertained by examination *with the finger after dilatation of* *the cervix* with a tent. In the majority of cases, certainty of diagnosis is possible only through *microscopic examination* of fragments removed by the curette. Should these show merely hypertrophied glands, we must remember that this is sometimes a transition stage to malignant disease. Typical carcinomatous cells are seen at fig. 279.

The *Differential Diagnosis* must be made from—

Portions of retained placenta,
Sloughing submucous fibroid,
Hæmorrhagic endometritis.

These conditions have been already described. As to the first of these we note that carcinoma sometimes developes during the puerperium. In three cases observed by Chiari, the development of carcinoma was directly connected with the puerperium and ran a rapid course to a fatal termination within six months after the birth of the child.

During the period of sexual activity, differential diagnosis is often extremely difficult; rapid growth and development of peritonitis fixing the uterus, point to malignant disease. After the meno-pause, the recurrence of hæmorrhage is an important diagnostic. The microscope is, when available, the most reliable guide.

TREATMENT.

As to the treatment of the symptoms, this is the same as in carcinoma of the cervix (*v.* chap. XL). As to the treatment of the disease, the scraping away of the polypoidal masses with the curette or sharp spoon gives temporary relief from the hæmorrhage and discharge. The only hope of cure lies in extirpation of the uterus. These cases are more favourable for extirpation than cases of carcinoma of the cervix, as there is a better prospect of excising the whole of the affected tissue.

CHAPTER XLII.

SARCOMA UTERI.

LITERATURE.

Clay, J.—On diffuse Sarcoma of the Uterus: *Lancet*, Jan. 1877. *Galabin*—Lond. Obst. Trans., Vol. XX. *Gusserow*—Die Neubildungen des Uterus: Stuttgart, 1878, S. 142. *Jacubash*—Vierfälle von Uterussarcom: Zeitschrift f. Geburts. u. Gyn., Bd. VII., Hft. I. *Kunert*—Ueber Sarcoma Uteri: Arch. f. Gyn., Bd. VI., S. 29. *Rogivue*—Du Sarcôme de l'utérus; Inaug. dissert., Zürich 1876. *Schrœder*—Op. cit., S. 301. *Simpson, A. R.*—Op. cit., p. 240. *Thomas*—Op. cit., p. 566; and Sarcoma of the Uterus, Lond. Obst. Journ., Vol. II., 1875, p. 437. *Virchow*—Die krankhaften Geschwulste: Bd. II., S. 350. For a full *resumé* of the literature, see Gusserow and A. R. Simpson.

By sarcoma we understand a *connective tissue* tumour of an embryonic type (Cohnheim). As we trace back carcinoma to the epithelium and true myoma to the muscular fibre, so we trace back sarcoma to the connective tissue.

For the recognition of sarcomata as of connective-tissue origin and the limitation of the term to malignant tumours of this type, we are indebted to Virchow. Formerly they were known in English literature as "recurrent fibroids"; the existence of this form of tumour in the uterus was recognised and fully described by Hutchinson (1857).

PATHOLOGY.

Unlike carcinoma, sarcoma rarely occurs in the cervix; in the larger proportion of cases it is in the *body* of the uterus.

It occurs in two forms:—

1. Diffuse sarcoma of the mucous membrane;
2. Circumscribed fibrous sarcoma.

The *diffuse sarcoma of the mucous membrane* arises from the subepithelial connective tissue. It appears as a general swelling of the mucous membrane which becomes soft and crumbly, or as irregular foldings or knobby projections into the uterine cavity; sometimes these projections have a polypoidal and apparently circumscribed character (fig. 292) so that this form passes insensibly into the fibrous. The masses have a greyish-white brain-like appearance and soft pulpy consistence. The mucous membrane may be broken down but is not deeply excavated as in carcinoma. On microscopic examination the mucous membrane is seen to be infiltrated with masses of closely-set round cells, more rarely spindle-cells. Epithelial-cell proliferation often complicates this form of sarcoma and brings it into close relation to carcinoma. Klebs has proposed to call such forms carcino-sarcomata.

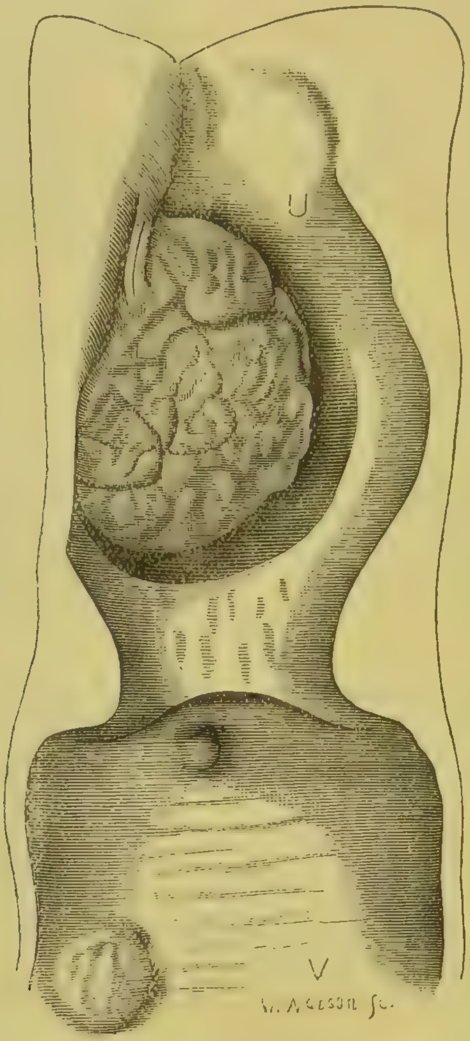


Fig. 292.

Sarcoma uteri with tumours in the vagina—from a specimen in the Pathological Institute at Strassburg (Gusserow).

The *circumscribed fibro-sarcoma* arises in the muscular coat ; like the fibroid it may be submucous, interstitial or sub-peritoneal and is found usually in the body, rarely in the cervix. The tumours are of a firm consistence, and feel like knots in the muscular wall of the uterus or project as polypi into its cavity; they thus resemble small fibroids, but *have no capsule.* Microscopically they consist of a localised sarcomatous—generally round-celled—infiltration (fig. 293).

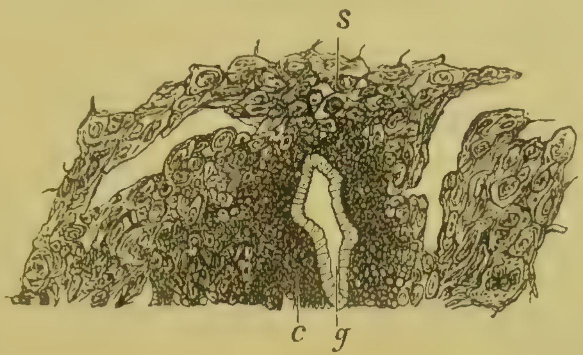


Fig. 293.

Microscopic section of the mucous membrane of the uterus in a case of sarcoma (Schrœder). *s* sarcomatous tissue; *c* small celled infiltration; *g* uterine glands.

In some cases it can be shown that sarcoma is a *degeneration of a fibroid tumour*, as in the following specimen described by A. R. Simpson. "On section it presented a uniformly smooth surface of pale pinkish colour, with some islands in it presenting the familiar cotton-ball structure and clear white glistening aspect seen on section of an ordinary fibroid tumour of the uterus, and separated from the softer surrounding tissue by a connective-tissue capsule (fig. 294). The larger part of the tumour was composed of fusiform nucleated cells, with an intercellular matrix having a fibrillated appearance, and running for the most part in small sections in parallel directions." A portion of the tumour, pro-

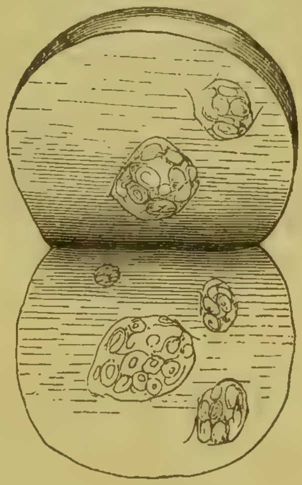


Fig. 294.

Sarcoma uteri, seen on section, showing fibroid nodules (A. R. Simpson).

bably then a fibro-myoma, had been removed five years previous to this; a third portion of the tumour, removed four years subsequent to this, showed only sarcomatous tissue.

Chrobach, Müller and others have traced the development of sarcoma in tumours which were originally undoubted fibroids. There is therefore no doubt that this is one mode of origin of fibro-sarcoma; whether (as Schrœder and Kunert have suggested) this is always the origin, is as yet undecided.

Secondary nodules may form in the vagina (fig. 292) and peritoneal cavity. Sometimes the peritoneum is affected by continuous spreading of the new growth outwards towards the peritoneal covering; here it causes adhesions, through which the sarcomatous infiltration may extend to other organs (Gusserow). A. R. Simpson records a unique case in which the infiltration spread along the mucous membrane of the Fallopian tubes (fig. 295) so that from their fimbriated ends there projected "rounded masses, having the appearance of the thrombus projecting from a small vein into a larger trunk." The uterus was of the size of a four-months pregnancy.

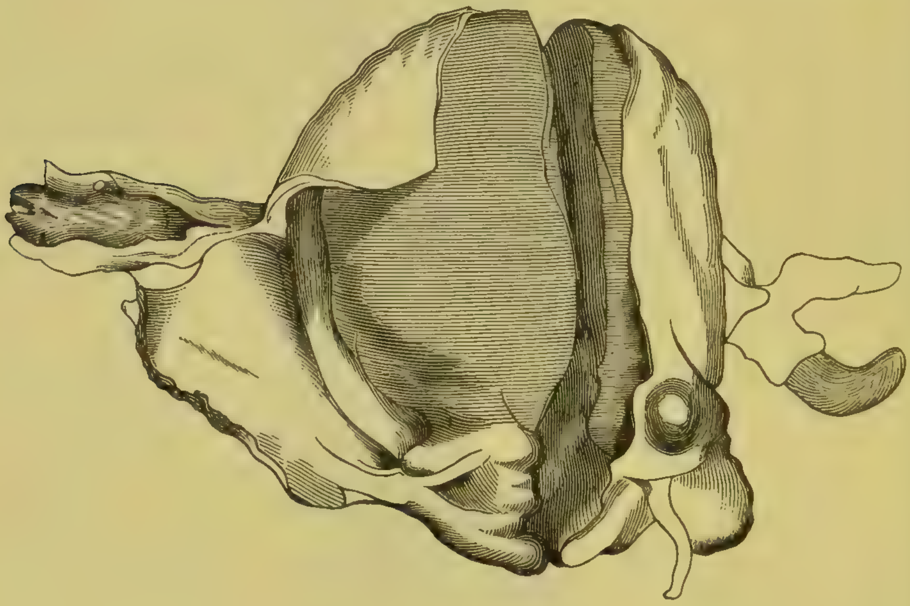


Fig. 295

Sarcoma uteri invading the Fallopian tubes and projecting from their fimbriated ends (A. R. Simpson).

A. R. Simpson draws attention to the frequency of *inversion of the uterus* as the result of sarcoma. We referred to it as a rare complication of pediculated submucous fibroid tumours. In sarcoma, it appears to occur more frequently—in 4 out of 48 cases. He attributes this to the paralysis of the muscular wall of the uterus through sarcomatous infiltration and to the peculiar dilatability of the cervix observed in some cases.

Sarcomata may undergo *mucoid degeneration*, resulting in a myxosarcoma. Large vascular spaces may form in their substance—as occurs in fibroid tumours ; in a case recorded by Jacubash, the bursting of such a vascular tumour into the peritoneal cavity proved suddenly fatal.

Metastatic deposits, though rare, are found more frequently in fibrosarcoma than in diffuse spreading sarcoma. They have been found in the lymphatic glands, lungs, liver, and vertebræ.

ETIOLOGY AND FREQUENCY.

Of the reason why a source of irritation should lead the connective tissue to produce a sarcomatous new-formation, we know as little as why the same cause produces a carcinomatous new-formation from the epithelium.

As to its frequency, a sufficient number of cases has not yet been collected to form any generalisation. It is, however, so rare that every carefully observed case which has been authenticated by microscopic examination should be placed on record. Up to 1878, Gusserow had collected 63 cases ; since that time Jacubash has collected 9 additional cases from German sources, Galabin has reported a case of sarcoma of the cervix, and we have seen two cases since 1879 in Professor Simpson's ward—one in the body of the uterus and the other in the cervix.

Age has the same predisposing influence as in fibroma and carcinoma. Of 62 cases collected by Gusserow—

2 were under 20,
3 „ between 20 and 30,
14 „ „ 30 „ 40,
26 „ „ 40 „ 50,
14 „ „ 50 „ 60,
2 „ „ 60 „ 70,
1 was above 70.

The number of sterile patients among those affected with sarcoma (25 out of 63) is noteworthy ; in this respect it contrasts with carcinoma (Gusserow).

SYMPTOMS.

The following symptoms characterise the early stage, in which the patient seeks advice :—

1. Hæmorrhage,
2. Absence of pain,

3. Watery non-offensive discharge,
4. Cachexia.

Hæmorrhage appears first as increase of the menstrual flow, or as irregular hæmorrhages after the menopause. As the new formation *does not ulcerate* rapidly like carcinoma, the increased menstruation is due to hyperæmia of the mucous membrane (Clay).

The *absence of pain* in the early stage is remarked on by Clay and A. R. Simpson; in this respect it differs from intra-uterine cancer. According to Gusserow, on the other hand, pain is frequently present and that of an intense and rending character. This apparent discrepancy of opinion may be explained by the varying progress of the infiltration. In the spreading of carcinoma, we noted that pain was most severe when the disease was extending upwards and compressing the nerve endings in the uterus and connective tissue; when it grew down into the vaginal cavity, it was painless.

The free rice-watery discharge has a slight odour but is not nearly so offensive as in carcinoma; this is due to the fact that there is not the same rapid ulceration and necrosis of tissue. When the disease has progressed further, the discharge becomes equally fœtid. The presence in the discharge of *greyish-white shreds*, like particles of brain matter, is diagnostic; under the microscope these are seen to consist of small portions of the neoplasm.

Cachexia is of importance as it helps us to distinguish developing sarcoma from a non-malignant polypus; the drain from the latter may make the patient gradually anæmic; but there are not the loss of flesh, the loss of appetite and the rapid failure of strength, which point to malignant disease.

DIAGNOSIS.

If the tumour projects through the os, the diagnosis is not difficult. The age of the patient with the symptoms given above and the existence of a *soft friable* pediculated tumour which springs *from the body* of the uterus, will point to the diagnosis; a portion, detached with the nail, shows the characteristic microscopical structure. When nothing projects through the cervical canal, we try to dilate it with the finger, or, if this fails, with a sponge tent or the rapid method described at page 422. The finger recognises a soft friable condition of the mucous membrane, or a distinct polypoidal tumour, or a localised thickening in the walls.

The uterus is in some cases distinctly enlarged and may reach halfway to the umbilicus or lie retroverted; in the early stages it is movable, but it soon becomes fixed.

The sound shows the cavity to be enlarged ; its use causes hæmorrhage and even flooding.

The differential diagnosis is here often very difficult, as these conditions are also present in—

Chronic endometritis (hæmorrhagic type),
Small fibroid tumours (interstitial or polypoidal),
Carcinoma.

Curetting the surface with microscopic examination of the scrapings, will help us in the first case.

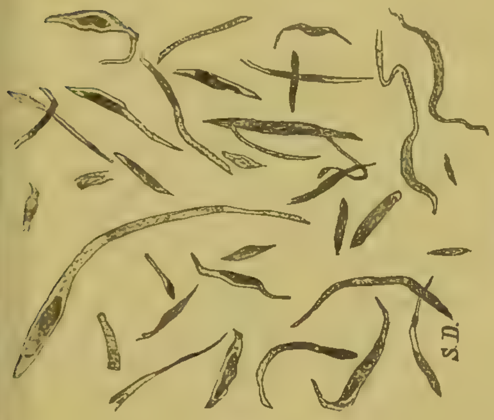


Fig. 296.

Scrapings from a fibroid tumour to show the size and form of the muscular fibre, their rod-shaped nuclei—stained, $\frac{250}{1}$; drawn by S. Delépine.

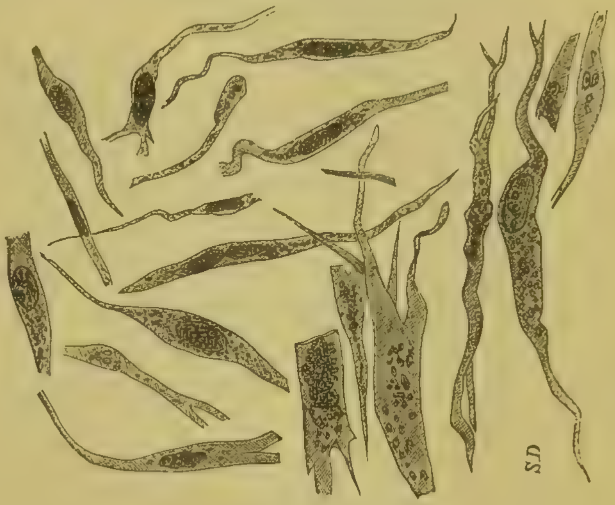


Fig. 297.

Scrapings from a spindle-celled Sarcoma to show the larger size of the spindle cells and their oval nuclei—stained, $\frac{250}{1}$; drawn by S. Delépine.

The removal of the polypoidal mass, with the finger nail or nail-curette, will enable us to examine its nature ; the possibility of both conditions being present, polypoidal fibroid + commencing sarcomatous degeneration, must be remembered. With an interstitial thickening, we can only watch the progress of the case.

In carcinoma of the fundus, there is generally excavation of the uterine wall and the base of the ragged surface is harder than in sarcoma. The examination of scrapings is not always decisive, as the cells found in sarcoma sometimes closely resemble epithelial cells.

In all cases of doubt we must watch for a few months, when the *rapid growth* of the tumour or the *development of cachexia* will clear up the case.

PROGNOSIS.

The prognosis is grave. Compared with carcinoma, its development is not so rapid nor are the symptoms of pain and offensive discharge so aggravated in the early stage. In two of the cases recorded by A. R.

Simpson the patient survived for four years after the diagnosis of sarcoma was made out, and Gusserow mentions a case where the course was prolonged for ten years.

The temporary relief procured by removal is longer of duration than in carcinoma. No case of radical cure is, as far as we know, recorded; after removal it reappears at periods varying from two to fourteen months (Clay). When it returns, the development of the new tumour is more rapid than that of the first growth.

As to the communication of the prognosis to the patient and friends, see under Carcinoma.

TREATMENT.

The tumour should be removed as soon as we suspect malignancy. Even when there is doubt, its removal will clear up the case.

The cervix should be well dilated so as to allow the finger to pass freely into the uterus. Gradual dilatation is preferable; injury of healthy mucous membrane in dilating or curetting should be avoided, as sarcomatous cells have become engrafted on a fresh wound surface.

When circumscribed and polypoidal, remove it with the finger nail or nail-curette. After its removal apply carbolic acid thoroughly to its base.

When diffuse, curette the uterus. Continue the scraping till all the loose tissue and irregularities of the mucous membrane are removed. After curetting the surface of the uterus, examine with the finger to ensure that all is removed and apply carbolic acid freely. When the os is widely dilated and the seat of the growth low down, cauterisation with Paquelin's cautery would be even more effectual. Clay injected perchloride of iron after curetting, and without any bad result; the application of the caustic on a rod is safer.

Extirpation of the uterus offers the only hope of radical cure (*v.* p. 459).

SECTION VI.

AFFECTIONS OF THE VAGINA.

These we shall consider in the following order:—

Chapter XLIII. Atresia Vaginæ.
„ XLIV. Inflammations of the Vagina: Vaginismus: New Formations.

CHAPTER XLIII.

ATRESIA VAGINÆ.

LITERATURE.

Barnes—Op. cit., p. 219. *Breisky*—Die Krankheiten der Vagina: Stuttgart, 1879. *Delaunay* — Étude sur le cloisonnement transversal du Vagin etc. : Paris, 1877. *Dohrn*—Angeborne Atresia vaginalis: Archiv. für Gynäk., X. 3. *Emmet*—Op. cit., p. 202. Congenital Absence and Accidental Atresia of the Vagina, etc. : Trans. Am. Gyn. Soc., II. p. 437. *Puech, A.*—Des Atrésis complexes des voies génitales de la Femme: Ann. de Gynécolog., Paris 1875. *Simpson, Sir J. Y.*—Op. cit., p. 256. *Simpson, A. R.*—Op. cit., p. 195. *Thomas*—Op. cit., p. 220.

Atresia (ἀ-τρῆσις, non-perforation) has been already defined as occlusion of the genital tract where the obstruction is complete and leads to accumulation of menstrual blood or mucous secretion. This occurs at three places—the *hymen*, the *vagina*, and the *cervix uteri*. Atresia of the *cervix* has been already described (*v.* Chap. XXIV). Accumulation of blood in one half of a *septate uterus or vagina* will be considered by itself at the end of this chapter.

PATHOLOGY.

1. Atresia Hymenalis. The structure of the normal hymen has been already described (page 6). In atresia hymenalis it forms a continuous membrane, is thicker and of an almost cartilaginous toughness; this explains the rarity of spontaneous cure by rupture of the membrane. This condition is produced by the occurrence of inflammatory adhesion of the folds after their formation, that is after the nineteenth week of foetal life. When the vagina is distended with menstrual blood, the hymen bulges forwards. As the menstrual blood accumulates, the vagina distends so as to form a tense membranous-walled sac nearly filling the pelvis with a smaller firmer body (the undilated uterus) rising from its upper surface (v. fig. 300). If the tension be not relieved, the cervix next becomes dilated and may rupture. Finally the uterus itself becomes opened out, though this does not occur till late.

During this period accumulations of blood may take place in the Fallopian tubes in the form of diverticula, usually situated towards the fimbriated end (fig. 298 and 299). These are not produced, as we should suppose, by a simple reflux of the blood from the distended uterus into the tubes but by hæmorrhage from the mucous membrane of the tubes themselves (Schrœder); the uterine end of the Fallopian tube is sometimes undilated or even entirely closed. Blood may escape gradually from the fimbriated end of the tube, and set up a localised peritonitis matting down the tube and uterus; a hæmatocele is sometimes thus produced.

2. Atresia Vaginalis. The *thickness of the obstruction* varies in different cases, according to the extent of the original obliteration and the thinning produced by the pressure from above. The *dilatation of the vagina* above the obstruction is remarkable; it may form a tumour filling the pelvis, pressing on the bladder and rectum, and raising the uterus above

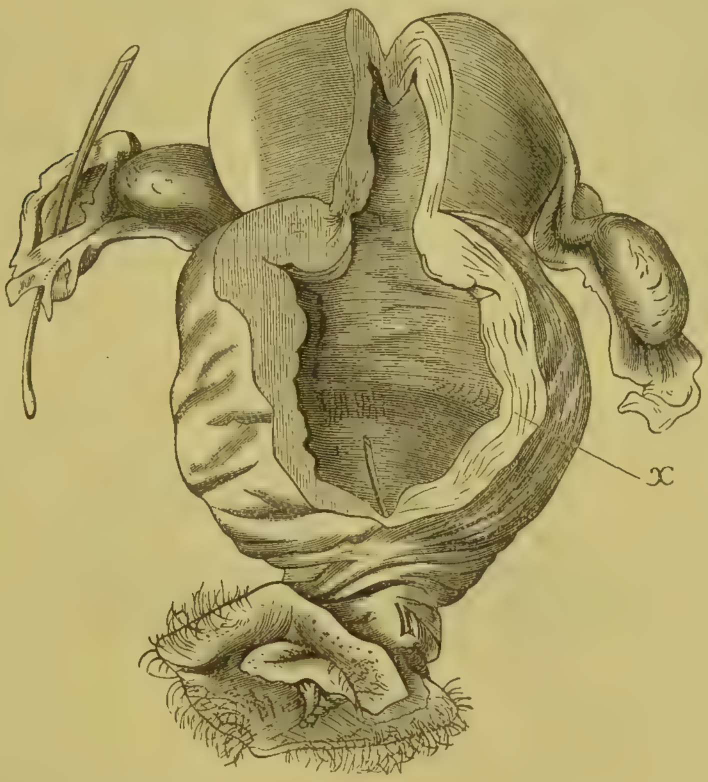


Fig. 298.

Atresia vaginæ, seen from behind. Thickness of obstruction (through which a probe is passed) 3-4 *mm.*: of vaginal wall below atresia 2-3 *mm.*, *above it* (*at x*) 6 *mm.* Dilatation of the body of the uterus is small compared with the common cavity formed by cervix and upper portion of vagina. Left Fallopian tube markedly dilated, with no distinct flexion on it, and changed at its free end into *a thin-walled blood sac which had burst.* Right tube undilated (Breisky).

the brim ; the walls become *hypertrophied* as is well seen in the preparation represented in fig. 298, taken from a patient who died on the same day as the operation for atresia was performed.

The *seat of the obstruction* is most frequently in the *lower third* of the vagina. This condition may be mistaken for imperforate hymen; as the wall of the sac, bulging through the hymeneal orifice, becomes adherent to the hymen which appears as a mere fringe on the bulging membrane. There is not, however, the same distension of the vulvar orifice and perineum as in atresia hymenalis. *Atresia of the whole vagina* is usually associated with imperfect development of the uterus (Breisky).

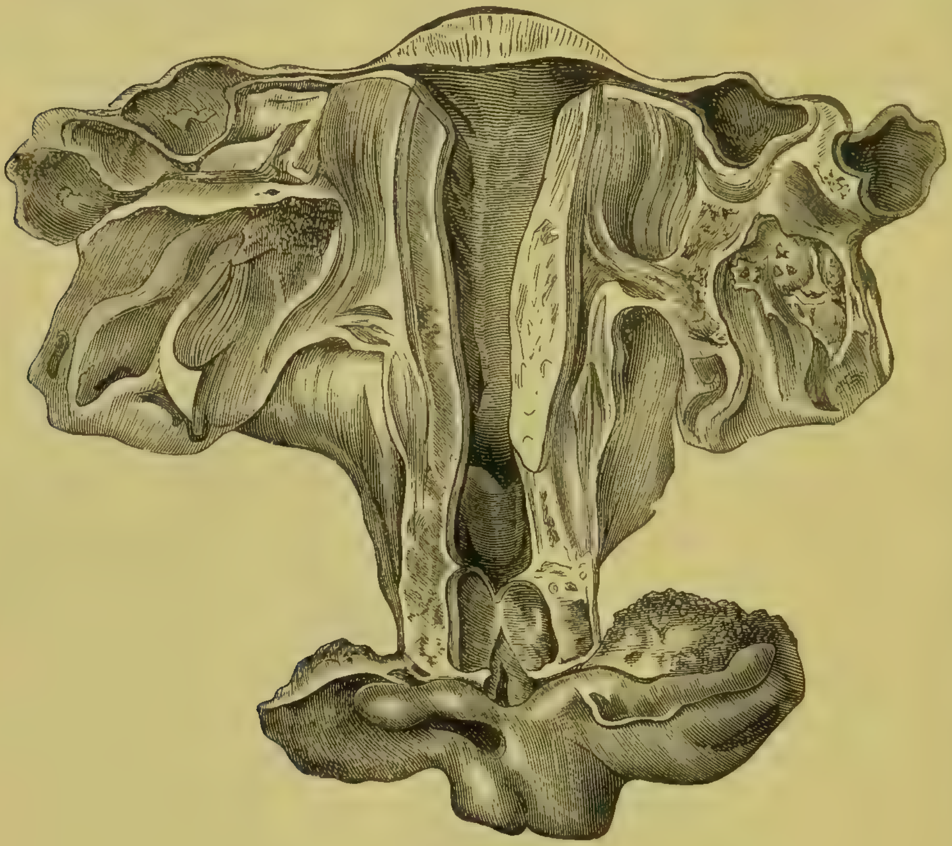


Fig. 299.

Case of double atresia. The *lower* affects the hymen and was *acquired*; above this was a cavity one inch long which contained purulent debris: the *upper* obstruction was one inch thick and was *congenital*; above it is the dilated uterus and cervix. The Fallopian tubes contain blood-sacs with small rents in their walls (Breisky, case reported by Steiner).

Atresia may exist at more than one point in the vagina. The specimen represented in fig. 299 illustrates this. It has this further interest that the lower atresia—at the vaginal orifice—was *acquired*, the result of a fall on a block of wood when the patient was two years old ; the upper atresia was *congenital*. The accumulation of menstrual blood in the upper sac called for operative interference when the patient was seventeen years of age. The lower sac contained purulent matter. On the fifteenth day after the operation, death occurred from septic peritonitis.

The character of the *retained menstrual blood* is peculiar. It is of a brownish chocolate-red colour, of a thick treacle-like consistence, and contains no coagula. Microscopically, it shows shrivelled red blood-corpuscles, flat epithelial cells, mucous corpuscles, extravasated blood-pigment, and granular debris. The mucus prevents coagulation; part of the fluid portion is probably reabsorbed, since the quantity removed is less than the sum of what we should expect from the successive periods passed (Puech).

ETIOLOGY.

1. Atresia may be *congenital,* due to non-development of a part of the canal or its subsequent closure during fœtal life.

Atresia hymenalis implies that the hymeneal folds were developed (at the 19th week) but afterwards became blended into a continuous membrane.

Atresia of the vagina just behind the hymen is, according to Dohrn, due to the fact that (at the 18th week of fœtal life) the walls of the genital canal become closely approximated behind the site of the hymen, so that closure of the vagina is especially favoured in that part.

Atresia of the middle or upper third implies the development of the ducts and their coalescence into a vagina, with a subsequent occlusion due perhaps to inflammation (Breisky).

Complete absence of the vagina or its representation by a fibrous cord is due to the non-development of the ducts of Müller; *absence of the lower third* is occasioned by the non-extension of the ducts downwards so as to open into the cloaca.

2. Atresia is also *acquired;* that is, it arises during life. The most important causes which produce this condition are the following:—

Sloughing and subsequent cicatrisation after labour;

Sloughing from impaired vitality in typhus, scarlet-fever, small-pox, and cholera;

Cicatrisation after injuries received in childhood;

Superficial inflammation of the mucous membrane, leading to adhesion of apposed surfaces.

The commonest form of congenital atresia is due to imperforate hymen; of acquired, is due to cicatrisation of the upper part of the vagina and cervix after labour.

SYMPTOMS.

As congenital atresia is productive of bad results only in so far as it impedes the menstrual flow, symptoms do not arise till puberty. Should menstruation not take place at puberty, the condition may not attract attention till the patient enters married life. Cases are however on record in which the accumulation of mucus has called for operative interference even in childhood ; and it is good practice to incise the hymen in the newly-born infant if we observe that it is imperforate.

At puberty the patient experiences menstrual molimina without the appearance of a discharge. As the vaginal sac distends, pain is felt in the pelvis at first only at the periods and then more continuously. With this there is also constitutional disturbance. The periods of suffering become more protracted, the intervals of relief shorter. When the dilated vagina presses on the bladder and rectum, it causes difficulty in micturition and defœcation. The abdomen swells and this, with the amenorrhœa, causes suspicion of pregnancy which is sometimes the occasion for seeking advice. If the case is left to itself it terminates fatally through rupture of the uterus or cervix (usually the latter) or of a blood sac in the Fallopian tube, or through a simple or septic peritonitis independently of rupture. In some cases, the obstructing membrane has given way by rupturing (in acquired atresia) or sloughing (in the congenital form). But even this is not a favourable termination, as the risks consequent on operative interference are still more likely to ensue when the hymen ruptures of itself.

DIAGNOSIS.

The importance of physical diagnosis will be evident from the following case. "A. B., aet. 16, unmarried, has for twelve months suffered from pain in the pelvis and back, with occasional acute exacerbations accompanied by nausea and vomiting. She has been treated for inflammation ; and mercurial ointment had been applied to a swelling which had appeared in the left groin, on the supposition that it was an enlarged gland." Examination per rectum showed a condition similar to that seen at fig. 301 ; the swelling in the left groin was the elevated uterus.

The practitioner will often ask himself whether a vaginal examination is necessary. On the patient's returning several times and there being nothing in the constitutional state (phthisis, chlorosis) to explain the amenorrhœa, tell the friends that there is no apparent cause for the non-appearance of menstruation except on the supposition of a mechanical obstruction to its outflow. If there be pain in the pelvis and marked constitutional disturbance, the reasons for demanding an immediate examination will be evident. The conditions found in the various forms of atresia will be easily understood by studying figs. 300 to 303. The external genitals are first examined; a wide urethral orifice may be mistaken at first glance for the vagina, as in *atresia hymenalis* the urethral orifice is more patulous than it is normally (Oldham); the hymen is seen bulging forwards at the ostium vaginæ. The finger is passed into the rectum and feels that the anterior wall is made to bulge inwards by a tense elastic sac. On bimanual (recto-abdominal) examination, this sac is felt to be equally distended and to fill the pelvis; it may extend into the abdomen as far as the umbilicus. The feeling of the sac is quite characteristic and is compared to that of a tense india-rubber ball (Schrœder); on its upper surface, the uterus is felt as a small firmer tumour.

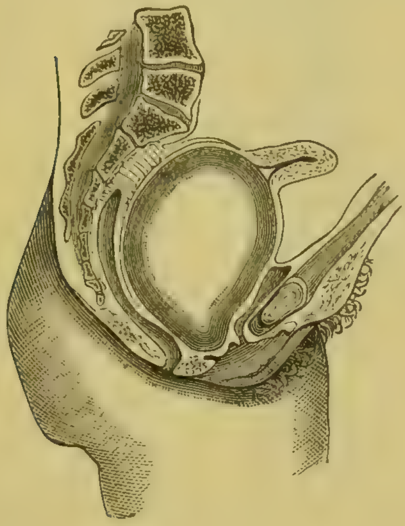


Fig. 300.
Atresia hymenalis (Schrœder).

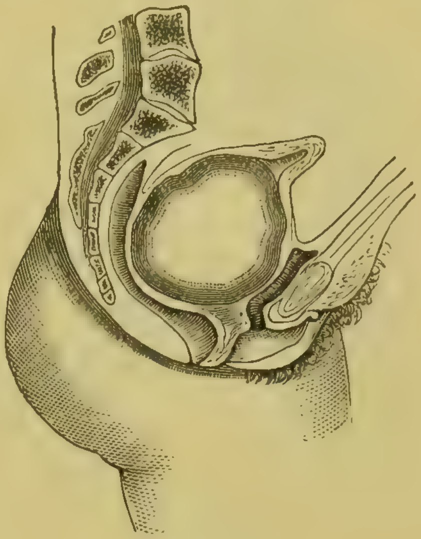


Fig. 301.
Atresia vaginæ—lower third (Schrœder).

In *atresia vaginæ* the condition is the same, except that the hymen does not bulge and that the sac does not extend so low down.

Atresia of the cervix (figs. 302, 303) might be mistaken for early pregnancy; as the amenorrhœa and the distended uterus are present in both cases. But the condition of the cervix, the form of the uterus, and specially the characteristic tense feeling of the tumour, enable us to distinguish it from a pregnant uterus. Malignant tumours (sarcomata) have a similar elastic consistence, but with them we should not have amenorrhœa.

It is not in all cases easy to say whether the atresia be congenital or acquired. The existence of other malformations would favour the former view, of cicatrices beside the obstruction the latter. There will also be a greater thickness of tissue felt between the urethra and rectum in the acquired form, corresponding to the obliterated vaginal canal.

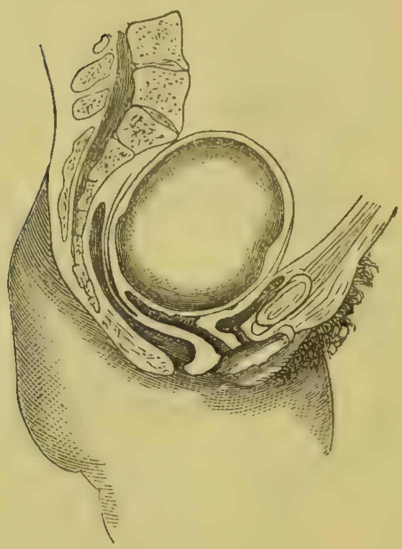


Fig. 302.
Atresia of cervix at os externum (Schrœder).

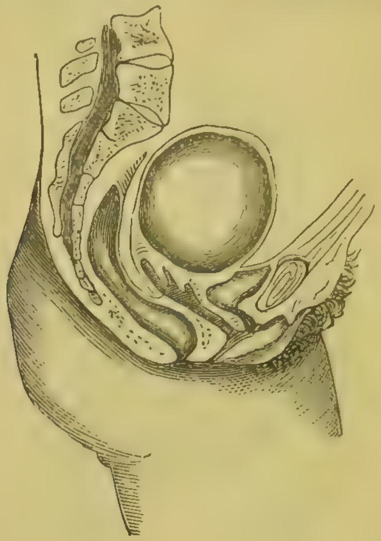


Fig. 303.
Atresia of the cervix at os internum (Schrœder).

In atresia vaginæ it is important to estimate the distance to which the atresia extends, so that we may know how much tissue we must cut through to reach the sac or the cervix uteri. This is best done by passing the index finger into the rectum till the tip is on the place where the bulging of the sac begins or where the projection of the cervix is felt; the thumb is at the same time passed into the ostium vaginæ till it reaches the obstructing membrane; the thickness of the latter can thus be ascertained.

PROGNOSIS.

If menstrual blood be accumulating, the prognosis is always grave. In atresia of the hymen the prospect of cure by operative treatment is more hopeful than in congenital atresia of the vagina. In acquired atresia of the vagina, if the obstruction be removable, the prognosis is favourable. The unfavourable cases are those in which the vagina is partially or not at all developed; the prognosis as to curability by operation depends on the thickness of the tissue between the urethra and the rectum, which determines the possibility of opening up a vagina.

When menstrual blood has accumulated, while explaining to the patient's friends the necessity of immediate operative treatment, we should inform them also of the dangers attendant on the operation—the immediate danger of rupture of a blood sac in the Fallopian tube, the more remote of simple or septic peritonitis.

TREATMENT.

The treatment consists in the formation of a channel to allow the menstrual blood to escape; in the case of imperforate hymen this is easily done by incising the membrane, but in atresia vaginæ we have to construct a new vaginal canal. Two dangers associated with this operation must be kept in view. *First*, too rapid collapse of the sac may lead to rupture of the Fallopian tubes or of vascular adhesions round the uterus. This rupture may be brought about in the following way, as has been shown by post-mortem examination. The Fallopian tube has been previously bound down to the side wall of the pelvis by adhesions; when the sac is opened into, the uterus necessarily follows its retreating wall and, if this retreat takes place rapidly, the tube is exposed suddenly to a strain which ruptures it; death results from hœmorrhage or peritonitis. To prevent this accident, the operator should allow the contents of the sac to escape slowly and should on no account apply pressure from above to hasten the process. *Second*, the operation is frequently followed by septicæmia. To prevent this, antiseptics should be used. Listerism cannot be carried out here; but by washing out the sac carefully with carbolised water, preventing the entrance of air, and allowing free drainage when fluid collects, we greatly diminish this risk.

A third danger, which follows some time after the operation, is the contraction of the new canal which, unless specially guarded against, may lead to its obliteration. Emmet expresses this well when he says "the surface of the canal is essentially a cicatricial one, and will consequently contract to a greater or less extent." To diminish the liability to contraction, he recommends that the tissues be torn with the finger nail or broken up with the scissors rather than divided with the knife; the raw surface is made to heal upon a glass plug.

We shall describe shortly the operations for (1) imperforate hymen, (2) atresia of the vagina, (3) atresia of the cervix.

1. *Imperforate Hymen.* This operation, though apparently simple, should never be performed in the consulting room but always at the patient's house or in hospital. The time chosen should be between two menstrual periods which are indicated by menstrual molimina. The hymen

is punctured with a small trocar which has been rendered thoroughly clean and aseptic beforehand. The fluid is allowed to escape slowly. After it has ceased to flow, the opening in the hymen is enlarged with a knife. This incision is made in the form of a cross, or the membrane is pinched up with forceps and an elliptical portion cut out. A. R. Simpson recommends that the opening in the hymen be made with the cautery, which prevents septic absorption by the wound. We can dispense with the trocar if we take care to make at first only a small opening, which can afterwards be enlarged. A stream of warm carbolised water is now made to flow gently into the cavity; the opening should be large enough to permit the fluid to flow outwards at the same time, so that the sac may be washed out without being subjected to any pressure. A plug of lint soaked in carbolised oil is placed in the hymeneal orifice, and a larger pad over the vulva. The patient keeps her bed for a few days after the operation. If there be a rise of temperature or other indication of septic inflammation, the vagina should be again washed out.

2. *Atresia of the Vagina.* The following is the method adopted by A. R. Simpson. The patient is placed in the lithotomy posture, and the labia are retracted by the fingers of the assistants who hold the thighs. The sound is passed into the previously emptied bladder; it is then held by an assistant in such a way that the urethra and bladder are drawn well upwards towards the pubis. The index finger (with, if necessary, the second) of the left hand is introduced into the rectum and the thickness of tissue between the finger and the sound, as well as the position of the distended sac above, carefully ascertained; the finger is kept in the rectum during the operation, both to hook that structure backwards so as to prevent its being cut into and to guide in tearing up the septum. Should the operator wish to have both his hands free to use instruments, an assistant can pass the finger into the rectum. The operator now makes with the knife a transverse incision over the hymen, or through the skin between the anus and the urethra. When the sac is reached, it is punctured and washed out with the same precautions as in the operation for imperforate hymen; it is then carefully and gently packed with strips of lint soaked in carbolised oil. These are taken out on the following day, but a tightly fitting plug is left in the newly formed portion of the vagina to prevent its contraction; after three or four days, a perforated glass plug (fig. 304) is passed in to keep the new canal dilated. The plugs are made of various thicknesses, and have a rim at the external end to prevent their being pushed in too far. The plug must not be so long as to press on the roof of the

vagina, and should be of such a thickness that, while it can be easily slipped out and in by the wearer, it stretches the new canal; it is kept in position by tapes which are fastened to the rim and, before and behind, to an abdominal band. A pessary can be employed subsequently; some instrument may have to be worn constantly for a year or more, and, where there is continued tendency to contraction, for a short period daily during many years.

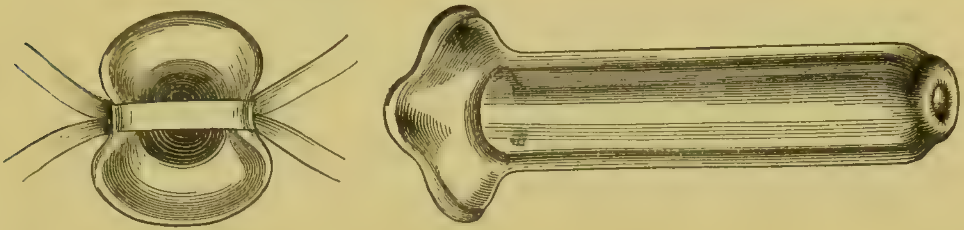


Fig. 304.

Perforated glass plug to be used after operation for atresia vaginæ. The left hand figure shows the external end of the tube with the tapes attached.

This operation has been performed even when there has been no accumulation of menstrual blood. The indications for operating are thus given by Thomas: "it should be resorted to (*a*) if menstrual blood be imprisoned; (*b*) if a uterus can be distinctly discovered and the patient be suffering from absence of menstruation; (*c*) if the necessity for sexual intercourse be imperative." Cases have been recorded in which the formation of a vaginal canal has led to the establishment of menstruation when it was formerly absent, to the development of the uterus and ovaries where these were rudimentary, or to an improvement in the general health of the patient although there was no indication of further development in the rudimentary uterus and ovaries.

More difficulty is experienced in operating where there is no accumulation of menstrual blood and the vagina is entirely absent or represented by a fibrous cord. In such a case, there is not the same necessity for surgical interference unless it be to satisfy the claims of married life. If the uterus and ovaries be well developed and the patient be anxious to have her condition remedied, the operation is justifiable. Here we have not the distended sac as a guide to the point on which we are to cut down. The cervix, of which the position should be ascertained by a combined recto-abdominal examination, should be fixed as far as possible by an assistant's making firm pressure from above upon the uterus; there is no danger in such pressure if there be no accumulation of menstrual blood. The mode of procedure is the same as that just described.

3. *Atresia of the Cervix.* Usually the obstruction is so slight that the forcible passage of the sound overcomes it. Should the obstruction resist all efforts to pass the sound we require to use the knife to open the canal. If the uterus be much distended with menstrual blood, it is safer to empty it first with the aspirator-needle passed through one of the fornices; the emptying should be effected slowly and, if the distension be considerable, at more than one sitting; rapid emptying is apt to set up uterine contractions which may produce rupture of a dilated Fallopian tube. To open up the cervical canal, the following method is adopted by Thomas. The cervix is steadied with a tenaculum. A long exploring needle is passed along the line of the cervical canal into the uterine cavity, the sense of resistance overcome and the escape of a drop of blood indicating that the needle has reached it. A delicate tenotome is placed in the gutter of the needle and pushed upwards for the required distance. This process is repeated so as to divide the cervix on four sides in a radiate manner. The cavity of the uterus is washed out with a syringe, and a glass tube passed into the cervical canal to keep it open.

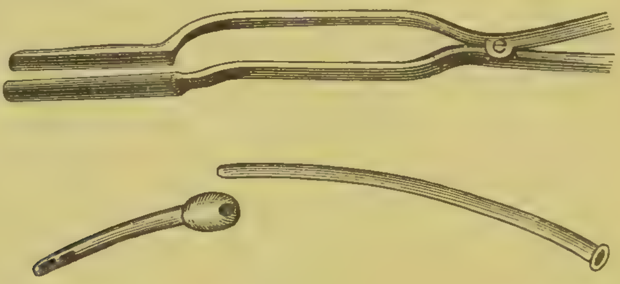


Fig. 305.
Breisky's forceps, tube, and nozzle for operating in atresia of the cervix (Breisky).

Breisky has devised the instruments represented in fig. 305, to facilitate the washing out of the uterine sac in cases of extensive atresia of the vaginal canal and cervix with hæmatometra. The septum which separates the urethra and bladder from the rectum is split up so as to form a new vagina, and the cervix is thus exposed. To form the new cervical canal, Breisky employs a knife-edged trocar running in a canula. The canula is pressed firmly against the cervix, and the knife is run out piercing through the cervix into the dilated uterus above; the canula is then run on the knife into the cavity, and the knife withdrawn. The contents of the sac escape through the canula. The forceps represented at fig. 305 are now passed in with one blade on each side of the canula. They are forcibly opened so as to distend the new canal still further, and they serve to keep it patulous while the canula is withdrawn and the tube represented at fig. 305 inserted in its place. This tube has two channels; into one of these a nozzle (fig. 305) fits and is employed to pass the stream of water into the sac, while the outflow takes place by the other.

4. *Atresia of one half of a septate uterus and vagina.* This form of atresia has certain characteristics which distinguish it from the other forms described above.

The chief peculiarity is that it presents the phenomena of free menstruation + those of retained menstruation.

The pathological condition is apparent from fig. 306. Spontaneous rupture of the septum with escape of the retained fluid (in this case through the patulous uterus or vagina) occurs more frequently in this than in other forms of atresia; rupture of the Fallopian tube, with its fatal consequences, is also a more frequent occurrence (Puech). The spontaneous rupture of the septum does not usually occur at its lowest point; hence there is liability to accumulation of purulent matter in the pouch below the point of perforation, which is a source of septicœmia.

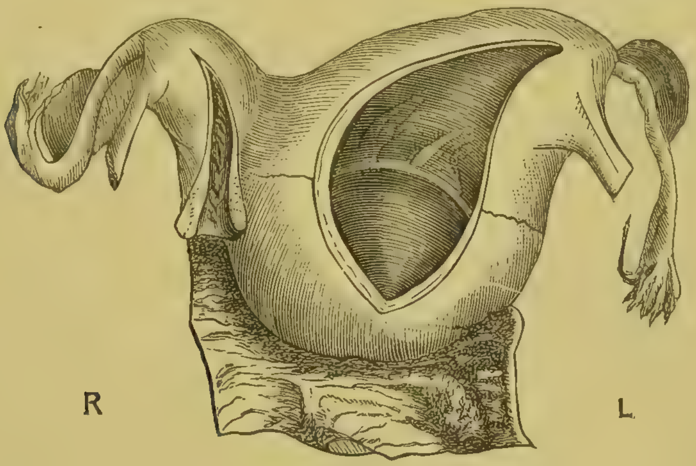


Fig. 306.

Septate uterus; the right half is pervious, the left half has been distended with retained menstrual blood (Schrœder).

The symptoms are the same as in the other forms of atresia, but they are masked by the presence of a menstrual flow. This visible menstruation is often irregular, and profuse leucorrhœa (from the patulous cavity) is frequently present.

The physical examination shows a fluctuating tumour lying beside the uterus and alongside of the patulous vaginal canal. Sometimes it winds in a spiral manner round the latter.

The diagnosis is not difficult if the blind sac extend to the ostium vaginæ and be felt running alongside of the vaginal canal or winding round it. If, however, it be limited to the side of the uterus or only extend partially on to the vagina, it may easily be mistaken for other para-uterine tumours—most frequently for hæmatocele (Schrœder). To clear up the diagnosis and also as a step towards treatment, we puncture the sac with the aspiratory-needle. The character of the discharged blood will indicate the diagnosis.

The treatment consists in slowly but thoroughly evacuating the sac, washing it out and establishing a permanent opening from it.

A *septate vagina* is sometimes found with a septate uterus (*v.* fig. 142), both halves being pervious so that there are no symptoms. Traces of a septate condition may persist as bands.

CHAPTER XLII.

VAGINITIS: VAGINISMUS.

LITERATURE OF VAGINITIS.

Barnes—Op. cit., p. 865. *Hennig*—Der Katarrh der weiblichen Geschlectsorgane. *Hildebrandt*—Monat. f. Geb., Bd. XXXII., S. 128. *Macdonald, Angus*—Edin. Med. Jour., June 1873. *Nœggerath*—Latent Gonorrhœa in the Female Sex : Am. Gyn. Trans., Vol. I., p. 268. *Ruge*—Zeitschrift, f. Geb. u. Gyn., Bd. II., S. 29, and Bd. IV., S. 133. *Schrœder*—Op. cit., S. 460. *Thomas*—Op. cit., p. 211. *Winckel*—Arch. f. Gyn., Bd. II., S. 406.

VAGINITIS.

Synonyms.—Colpitis (Gr. *κόλπος, a fold*); Elythritis (Gr. ἔλυτρον, a sheath).

NATURE AND VARIETIES.

Vaginitis is an inflammation of the mucous membrane of the vagina. The structure of this mucous membrane has been already described (v. p. 26). From its consisting of connective-tissue papillæ covered with several layers of squamous epithelium, it resembles the structure of the skin rather than that of a mucous membrane; it is a disputed point whether true mucous glands with ducts are present. Consequently, the inflammatory changes are more allied to those of the skin than to those of a mucous membrane (Schrœder).

According to etiology, vaginitis is either *simple* or *gonorrhœal.* Apart from the history, we cannot for certain distinguish between these (v. Etiology).

The clinical distinction between *acute* and *chronic* vaginitis is merely a question of degree.

Diphtheritic vaginitis will be referred to by itself.

Senile vaginitis is one of the physiological retrogressive processes occurring after the meno-pause.

PATHOLOGY.

Vaginitis occurs most frequently in the form of slight elevations of the mucous membrane, which produce a granular surface. These granulations, according to Ruge, consist of groups of papillæ infiltrated with small cells; these swell up and push before them the stratified squamous epithelium, the superficial layers of which are shed (fig. 307).

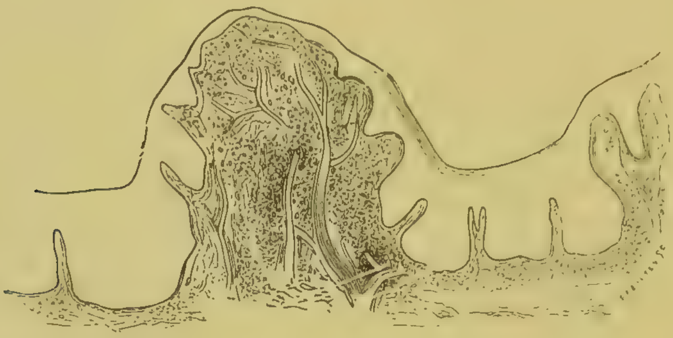


Fig. 307.
Granular vaginitis—acute form (Schrœder).

When the condition has existed some time, the surface becomes more equal through the thinning of the epithelial covering (fig. 308).

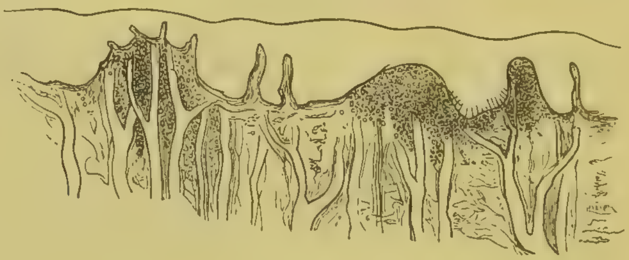


Fig. 308.
Granular vaginitis—chronic form (Schrœder).

Associated with vaginitis in pregnancy, there is sometimes an emphysematous condition of the vaginal mucous membrane. Winckel has described cysts containing gas and fluid; according to Ruge, the air is present in spaces among the cellular tissue (fig. 309).

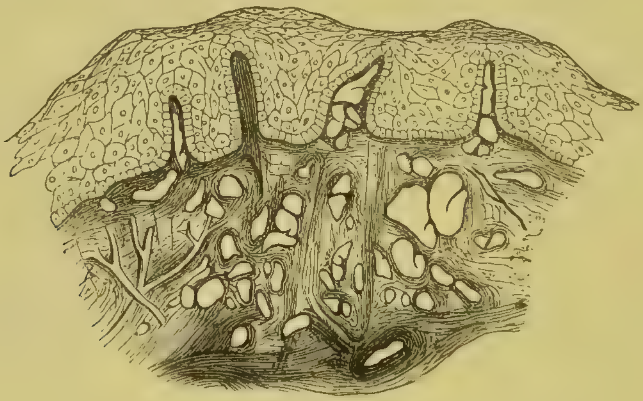


Fig. 309.
Colpitis emphysematosa (Schrœder).

The cicatricial contraction of the vagina observed after the meno-pause, is due to a senile vaginitis. The epithelium is shed in patches, and the raw surfaces thus produced adhere together (Hildebrandt). This process is similar to that which produces occlusion of the cervical canal after the meno-pause.

Diphtheritic vaginitis occurs either as localised patches or as an affection of the whole vagina. In the latter case, the mucous membrane may be so swollen that the finger scarcely reaches the cervix which also is found to be thickened and covered with the diphtheritic membrane.

ETIOLOGY.

The following are the most important causes :—

Gonorrhœal infection ;
Irritating discharges from the uterus ;
Injurious vaginal injections, badly-fitting pessaries or other causes which injure the vaginal mucous membrane ;
Exanthemata.

Gonorrhœal infection produces the most intractable form of vaginitis, which may extend over months or years. We have not space here to discuss the question whether there is a specific poison in the gonorrhœal discharge.

Irritating discharges from the uterus, as in endometritis, produce a secondary vaginitis which can only be treated by curing the uterine affection. In carcinoma and vesico-vaginal fistulæ, vaginitis arises secondarily.

Among the causes which irritate or injure the vaginal mucous membrane, we mention injections of too hot or too cold water and of substances to produce abortion, badly-fitting pessaries, tampons or pieces of sponge which have been allowed to lie some days in the vagina. Vaginitis may also develope on a patient's entering married life, simply from awkwardness in sexual intercourse; on being consulted about such cases, we must remember that *a simple vaginitis may produce all the symptoms of one due to gonorrhœa.*

Diphtheritic inflammation occurs usually in the puerperal condition and that through bad hygiene. It has been observed in *typhus, small-pox, and cholera*, and also in some cases of gonorrhœa. Localised diphtheritic patches are seen in fistulæ, in carcinoma, and round badly fitting pessaries.

SYMPTOMS.

These are the following :—

A burning heat in the vagina ;
Pain in the floor of the pelvis ;
Frequent desire for micturition, with a scalding sensation while water is passing ;
Free muco-purulent leucorrhœa.

These symptoms are present both in simple vaginitis and that due to gonorrhœal discharge. In the latter case, the urinary symptoms are more pronounced ; there is a distinct period from which all the symptoms commenced, their duration is longer, and they resist treatment ; they are often complicated with those of endometritis, cystitis, or pelvic peritonitis.

DIAGNOSIS.

On vaginal examination, the finger recognises the discharge which escapes on separating the labia and, in many cases, the rough condition of the mucous membrane.

The speculum shows that the mucous membrane is inflamed and covered with muco-purulent discharge ; the redness is usually in the form of patches but may be diffuse.

The appearance of the cervix must be noted to ascertain that the leucorrhœal discharge does not come from it ; the differentiation of discharge from the uterus and that from the vagina, is made as described on page 280.

The *differential diagnosis* between *simple and gonorrhœal* vaginitis is often very difficult. The history of a distinct source of infection is the only certain guide, and the ascertaining of this is a very delicate question. Apart from this, the following conditions point to a gonorrhœal origin : sudden development of vaginitis with urinary symptoms, in a patient who has had previously no marked leucorrhœal discharge ; absence of any other cause to explain these ; protracted duration of symptoms and resistence to treatment. However convinced the practitioner may be in his own mind that the vaginitis is of a specific nature, the social unhappiness caused by his expressing a decided opinion should deter him from giving it in cases where a cause is not admitted.

Pelvic abscesses discharging through the roof of the vagina have been mistaken for vaginitis (Thomas). Such a mistake will not arise when the bimanual and other methods of examination are employed. We must not be satisfied with finding vaginitis ; the whole routine examination of the pelvic organs must be made after the pressing symptoms have been relieved.

TREATMENT.

In *acute cases*, rest in bed is necessary. Warm water injections are given three or four times daily, the douche is much more convenient than the syringe ; it leaves the hands free, requires less exposure of the patient, and keeps up a steady stream (*v.* p. 137). The stream should run for a quarter of an hour. A piece of gutta-percha tubing, weighted at one end and with a clip at the other, makes a handy douche ; the weighted end is placed in a ewer of water above the level of the bed, the tube is coiled up in the water so as to be filled, the clamp is put on at the other end and the tube withdrawn ; the siphon action is started by the column of water in the tube and continues till the ewer is empty. The bowels are freely moved and then a morphia suppository is given ; in severe cases, the patient may be kept under opium. Complete rest from sexual activity is absolutely necessary.

In chronic cases or after the acute stage has passed off, astringents are added to the injections. The vaginal walls having been first thoroughly dried, a solution of nitrate of silver (ʒ1 to ℥1 of water) is applied and a tampon of carbolised cotton soaked in glycerine introduced to keep the walls apart (Thomas).

Applications to the vagina are usually made by means of medicated pessaries. The following are those most frequently used * :—

Atropine	Sedative . . .	1-20 grain.	
Belladona . . .	do. . . .	2	do. Alo. Ext.
Morphia	do. . . .	½	do.
Bismuth, Oxide . .	Cicatrizing & Emollient	15	do.
Borax	do. do.	15	do.
Zinc, Oxide . . .	do. do.	15	do.
Tannin	Astringent . .	10	do.
Alum	do. . .	15	do.
Acetate of Lead and Opium	do. . .	5	do. 2 gr. Opium.
Gallic Acid . . .	do. . .	10	do.
Persulphate of Iron . .	Hæmostatic . .	5	do.
Sulphate of Zinc (dried) .	Caustic . . .	10	do.
Iodide of Lead . .	Alterative & Resolvent	5	do.
Mercurial . . .	do. do.	30	do. (*Ung. Hydrarg*).
Carbolic Acid . . .	Deodorant . .	5	do.

Lawton's absorbent cotton † is the best material for vaginal tampons which are to be soaked in glycerine or other medicaments.

---

* As made up and supplied by Messrs Duncan, Flockhart & Co.

† Sold in packets (2 oz.—½ lb.).

VAGINISMUS.

LITERATURE.—*Duncan, Matthews*—Clinical Lectures, p. 121. *Hildebrandt*—Archiv. f Gyn., Bd. III., S. 221. *Scanzoni*—Lehrbuch der Krankheiten der weiblichen Geschlectsorgane: Wien 1875, S. 704. *Simpson, Sir J. Y.*—Edin. Med. Journ., Dec. 1861; and op. cit., p. 284. *Sims*—Cases of Vaginismus: Americ. Med. Times 1862, No. 22 to 25. *Thomas*—Op. cit., p. 203. *Till*—The Lancet, Aug. 1874.

By vaginismus, we understand a reflex contraction of the muscular fibres surrounding the vaginal orifice—just as laryngismus is applied to the same condition in the larynx.

ETIOLOGY.

It is found in some patients of a nervous and sensitive temperament without there being any local source of irritation, but this is exceptional.

Usually one of the following conditions is present:—

An irritable spot in the fossa navicularis;
An inflamed hymen which has not been ruptured, or irritable carunculæ myrtiformes;
Fissures in the fourchette or round the vaginal orifice;
Small ulcers within the hymen;
Fissure of the anus;
Urethral caruncle.

SYMPTOMS AND DIAGNOSIS.

Dyspareunia and sterility are the leading symptoms.

By *dyspareunia* (a term introduced by Barnes), we understand painful or difficult sexual intercourse; hence the conditions which produce vaginismus arise on the patient's entering married life. The suffering may be so great that medical advice is at once sought; more frequently, a sense of delicacy prevents this till the condition has existed some time.

In some cases there is a care-worn and anxious expression of countenance, in others a hysterical manner. As the ordinary vaginal examination is painful—the patient involuntarily drawing away as soon as the painful spot is touched—it is best to make inspection of the genitals first. Here we may see any of the conditions mentioned under pathology. Sometimes no local cause is evident; but on carrying the finger into the vagina the reflex contraction of the muscle is felt.

Hildebrandt has shown that this muscular contraction is sometimes noticed in the upper part of the vagina, and is then due to spasm of the levator ani.

The possibility that the dyspareunia may be due to some local pathological condition at the roof of the vagina (prolapsed ovary or cellulitis) and not at the ostium, should be kept in mind.

The *prognosis* as to cure is good. From the distressing nature of the symptoms and the relief obtained by the means to be described, they prove very satisfactory cases for treatment.

TREATMENT.

First remove any cause of local irritation, as urethral caruncle or irritable carunculæ myrtiformes; in some cases it is necessary to clip away carefully the whole hymen. Divide the base of irritable fissures with the knife, or touch them with the actual cautery. Iodoform in powder or made into an ointment, is the best local application to allay irritation or favour healing. Its penetrating and disagreeable odour makes many patients object to it. This is diminished by keeping Tonquin beans in the powder, and by adding oil of eucalyptus to the ointment or pessary.

℞	Iodoform.	gr. x.
	Olei eucalypti	M. i.
	Fiat pessarium.	Mitte tales xii.
	Sig. As directed.	

After the cause has been removed, the ostium vaginæ must be dilated. This is best effected by making the patient wear a vaginal dilator night and morning, for an hour at a time; it may be made of wood or of glass, and is of a conical form. The pain caused by the introduction passes off after a time. Dilators of gradually increasing size should be used.

If the dilator cannot be worn, we must have recourse to Sims' operation. In some cases, when the vaginismus is evidently due to the narrowness of the ostium and specially when a reflex contraction of the muscle is noted, this operation is done without previous use of the dilators.

Sims' operation for vaginismus. We have already seen (p. 8) that the bulbo-cavernosi muscles embrace the ostium vaginæ and form a kind of sphincter for it; their position is seen in fig. 7. To divide the superficial fibres of this muscle is the aim of the operation.

The patient being under chloroform, two fingers of the left hand are passed into the vagina so as to stretch the ostium. With an ordinary scalpel, an incision is made on each side of the fourchette; the incision is about 2 inches long, and extends from $\frac{1}{2}$ an inch above the ostium to the raphe of the perineum. The ostium is now thoroughly and firmly plugged with lint which is kept in place with a T bandage; thorough plugging is essential as there is often smart hæmorrhage from the incisions. Next day the lint is removed and a glass dilator introduced, which must be worn for one or two hours night and morning during a period of several weeks.

Instead of dividing the sphincter with the knife, it may be forcibly stretched with the fingers till the muscular fibre is ruptured. This is done by passing the thumbs (Tilt) or several fingers (Hegar) of each hand into the ostium, and then forcibly separating them till we feel the muscular fibre give under the traction. The advantage of this method is that it is bloodless and there is no granulating wound left to heal.

With these local measures, we should always combine constitutional treatment. Exercise, fresh air and change of scene are beneficial. It is self-evident that complete rest to the sexual system must be strictly enjoined during any course of local treatment; this should be maintained for some time afterwards, which may be secured by recommending a few weeks change to a Hydropathic. Tonics (such as quinine, iron, and arsenic) are given as the case requires.

TUMOURS OF THE VAGINA.

Under tumours of the vagina we briefly describe the following :—

Cysts,
Fibroid tumours,
Carcinoma,
Sarcoma.

Tubercular and syphilitic ulceration do not call for special description.

CYSTS OF THE VAGINA.

LITERATURE. *Breisky*—Die Krankheiten der Vagina: Stuttgart 1879, S. 130. *D Sinéty*—Op. cit. p. 164. *Mundé*—Americ. Jour. of Obst., vol. X. p. 673. *Von Preuschen*—Virchow's Archiv., Bd. LXX. S. 3.

Pathology. They are situated most frequently in the anterior vaginal wall, and usually in the lower third but within the ostium. They are generally single, rarely have two or more been found together. They are lined with a single layer of cylindrical epithelium which contrasts with the many layers of squamous epithelium of the vaginal mucous membrane from which they lie separate (fig. 310). We have seen them of the size of a hen's egg. Their contents vary from a clear thin fluid to a gelatinous chocolate-coloured inspissated mucus.

Etiology. As there are no mucous glands present in the vaginal mucous membrane, the mode of origin of these cysts is disputed. In some cases they can be traced to crypt-like depressions of the mucous membrane which become shut off (Von Preuschen). It has been suggested by Veit that they are due to persistence of the canals of Gärtner, an exceptional occurrence.

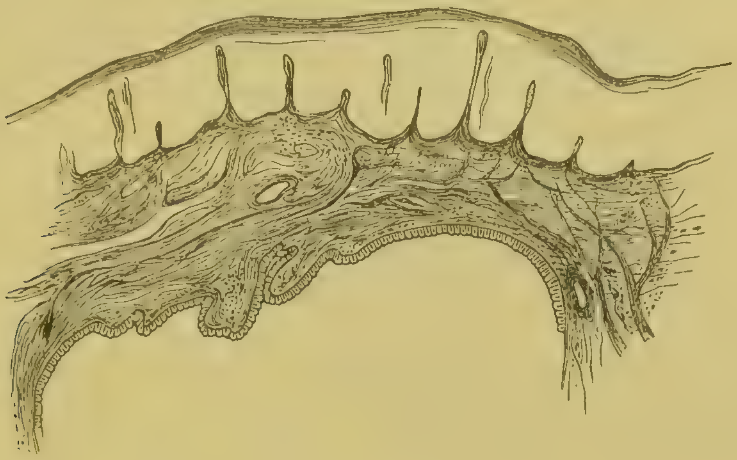


Fig. 310.

Section of vaginal cyst (Schroeder). The cyst wall which is lined with a single layer of epithelium is separated by some tissue from the mucous membrane which is covered with many layers of squamous epithelium not detailed in the section.

Symptoms. These are often nil; and such cysts readily escape observation, so that they may be more frequent than is supposed. When of large size, they produce bearing down pain with leucorrhoea and in some cases dyspareunia.

Diagnosis. Small cysts readily escape detection. When large, their smooth elastic surface and fluctuation make them easily recognised. They must not be confounded with cysts due to obstructed Bartholinian glands, which are situated on the labia minora or just at the ostium. Careful examination will easily distinguish them from a pouching of the bladder or rectum.

Treatment. This consists in laying the cyst open and destroying its lining wall, which is best done by the cautery. Schrœder cuts out a portion of the cyst wall, and stitches the margins of the rest to the adjoining vaginal mucous membrane so that the cyst is taken up into the vagina; this does away with the granulating surface and subsequent cicatrisation which accompany cauterisation. If the patient is past the meno-pause and the cyst gives no trouble, there is no occasion to interfere.

FIBROID TUMOURS OF THE VAGINA.

Literature. *Breisky*—Die Krankheiten der Vagina, S. 139. *A. R. Simpson*—Fibroma Vaginæ, op. cit. p. 201.

Pathology. Fibroid tumours rarely originate in the vagina; Breisky has collected only 37 cases out of their literature. Like fibroid tumours of the uterus, they consist chiefly of fibrous tissue with some unstriped muscular fibre; they are usually situated in the anterior wall, in 17 out of 27 cases (A. R. Simpson); they are pediculated (forming so-called fibrous polypi) or sessile.

Symptoms. These are produced only when the tumour is large. In the case described by A. R. Simpson, in which the tumour was the size of two fists, it interfered with micturition and the escape of the uterine discharges.

Diagnosis. This is easy, except in the case of large tumours when the pedicle is difficult to reach. The relation of the bladder should always be carefully ascertained.

Treatment consists in division of the capsule and enucleation of the tumour when it is sessile, or ligature and division of the pedicle when it is pediculated.

CARCINOMA OF THE VAGINA.

LITERATURE. *Breisky*—Op. cit., S. 151. *Bruckner*—Der primäre Scheidenkrebs und seine Behandlung, Zeitschrift für Geburtshülfe und Gynäk., B. VI., Hft. 1., S. 110. *Goodell*—Boston Gyn. Jour., vol. VI., p. 383. *Küstner*—Archiv. f. Gynäk., Bd. IX., S. 279. *Parry*—Amer. Jour. of Obstet., vol. V., p. 163: and Philad. Med. Jour., Feb. 1, 1873. *Simpson, A. R.*—Op. cit., p. 205.

Pathology. Primary carcinoma occurs very rarely in the vagina—in 14 out of 8287 cases (Beigel); in the paper cited above, Küstner has collected but 28 cases out of the whole literature. This is the more surprising when we remember how very frequently it affects the cervix. It occurs in two forms, either as a localised broad-based papillary swelling seated most frequently in the posterior wall or as a diffuse infiltration which often constricts the canal in a ring-like manner. The inguinal glands are generally enlarged by carcinomatous infiltration.

Symptoms and Diagnosis. As in carcinoma of the cervix, there is hæmorrhage and fœtid discharge; the pain is slight in the early stage. The diagnosis that there is *primary* carcinoma of the vagina is often doubtful, because it is difficult to ascertain the condition of the cervix and uterus; in the specimen represented at fig. 275, it was supposed to be primary until the post-mortem showed that it was secondary to carcinoma of the cervix. The examination per rectum is useful in these cases.

Treatment. This consists in the removal of as much as possible of the diseased tissue with the cautery, spoon, or knife. Bruckner recommends that, where possible, the wound produced by extirpation of the carcinomatous mass be closed by deeply placed sutures.

SARCOMA VAGINÆ.

LITERATURE. *Breisky*—Op. cit., S. 150. *Man*—Amer. Jour. of Obst., vol. VIII., p. 541. *Meadows*—Lond. Obst. Trans., vol. X., p. 141. *Simpson A. R.*—Op. cit., p. 204. *Smith*—Amer. Jour. of Obst., vol. III., p. 671. *Spiegelberg*—Arch. f. Gyn., Bd. IV., S. 348.

Sarcoma of the vagina has only recently been described, and is still rarer than sarcoma uteri. As in the uterus, it is either diffuse or in circumscribed nodules. The symptoms are the same as in sarcoma uteri; and the treatment consists in removal (more easily effected in the circumscribed form), which in a case reported by Spiegelberg effected a permanent cure.

SECTION VII.

AFFECTIONS OF THE VULVA AND PELVIC FLOOR.

CHAPTER XLV. The Vulva: Malformations; Inflammation; Tumours.
" XLVI. Rupture of the Perineum and its operative treatment.
" XLVII. Displacements of the Pelvic Floor: Prolapsus Uteri; Enterocele.

CHAPTER XLV.

THE VULVA: MALFORMATIONS; INFLAMMATION; TUMOURS.

LITERATURE.

MALFORMATIONS. *Hildebrandt*—Die Krankheiten der äusseren weiblichen Genitalien: Stuttgart, 1877, S. 2. *Meyer*—Virchow's Archiv., XI., p. 420. *Schrœder*—Op. cit., S. 497. *Simpson, Sir J. Y.*—Hermaphroditism: Collected Works, Vol. II. p. 407. *Tait, Lawson*—Am. Gyn. Trans., Vol. I., p. 318.

INFLAMMATION. *Hildebrandt*—Op. cit., S. 17 and 64. *Simpson, Sir J. Y.*—Diseases of Women, p. 286. *Thomas*—Op. cit., p. 122.

TUMOURS. *Hildebrandt*—Op. cit. Chap. VII., where the student will find the literature of the various forms of tumour fully given.

MALFORMATIONS.

THESE are easily understood when we remember the normal development of the external organs of generation. 1. At the sixth week of fœtal life, the *genital eminence* appears externally; at this period the rectum, allantois and ducts of Müller communicate with one another but not with the exterior (fig. 311). 2. At the tenth week, a depression of the skin (known as the *genital cleft*) occurs; this extends inwards till it meets the conjoined allantois and rectum, and thus the cloaca is formed (fig. 312). 3. The tissue between the rectum and the allantois grows downwards, and divides the cloaca into an anterior part (the *uro-genital sinus*, into which the ducts of Müller open) and a posterior part

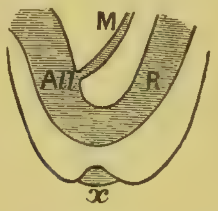


Fig. 311.

R rectum continuous with *All* allantois (bladder) and *M* duct of Müller (vagina). *x* depression of skin below genital prominence which grows inwards and forms vulva (Schrœder).

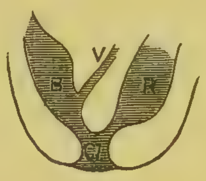


Fig. 312.

The depression has extended inwards and, becoming continuous with the rectum and allantois, formed the cloaca *cl* (Schrœder).

(the anus); thus the *perineum* is formed (figs. 313 and 314). 4. The uro-genital sinus contracts in its upper portion to form the urethra, while the lower part persists as the vestibule (fig. 315); the ducts of Müller coalesce to form the vagina (*v.* p. 69).

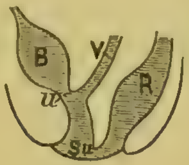


Fig. 313.

The cloaca is becoming divided into urogenital sinus *Su* and anus by the downward growth of the perineal septum. The ducts of Müller have united into the vagina *V* (Schrœder).

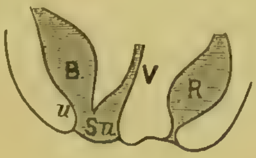


Fig. 314.

The perineum is completely formed (Schrœder).

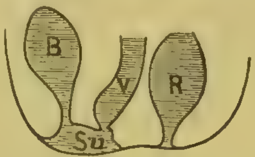


Fig. 315.

The upper part of the urogenital sinus has contracted into the urethra; the lower portion persists as the vestibule *Su* (Schrœder).

The parts round the vulva develope, therefore, as follows; the *clitoris* from the genital eminence, the *labia minora* from the margins of the genital cleft, the *vestibule* from the uro-genital sinus.

The following malformations have been described. 1. *Complete atresia of the vulva* through the non-formation of the depression of the skin (fig. 311); the allantois and rectum either communicate as in fig. 311 or have become separated. This condition has only been found in fœtal monstrosities. 2. *Persistence of a cloaca* so that the rectum, vagina and urethra have a common orifice (fig. 312); such cases are sometimes spoken of as atresia of the anus but are really due to non-formation of the recto-vaginal septum. 3. *Persistence of the uro-genital sinus* into which the bladder opens directly as the urethra has not formed (fig. 314); in such cases the vulvar orifice is contracted and opens into a long narrow vestibule which, at its farther end, communicates with the bladder and vagina. This condition is sometimes described as hypospadias.

HERMAPHRODITISM.

For a detailed description of this condition with illustrative cases, the student should consult Sir J. Y. Simpson's exhaustive article on Hermaphroditism (Collected Works, Vol. II. p. 407).

Of hermaphroditism (Ἑρμῆς and Ἀφροδίτη) there are two varieties, true and spurious.

By *true hermaphroditism*, we understand that from the Wolffian bodies both ovary and testicles have developed so that both forms of gland co-exist in the same individual. This is an extremely rare occurrence; when it has occurred, there is a tendency towards the better development of one form of organ (determining the sex) while the other is rudimentary. According to Hildebrandt (loc. cit., S. 6), only two authentic cases of bilateral hermaphroditism (ovary and testicle present on each side) have been recorded; of unilateral hermaphroditism (ovary and testicle present on one side, the other side having only one form of gland), a case has been recorded by Bannon; lateral hermaphroditism (ovary on one side and testicle on the other) has been more frequently met with and cases, confirmed by microscopic examination, have been recorded by Berthold, Barkow, and Meyer.

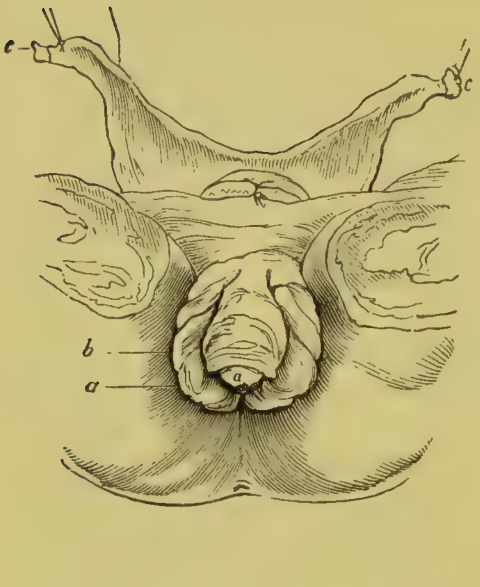


Fig. 316.

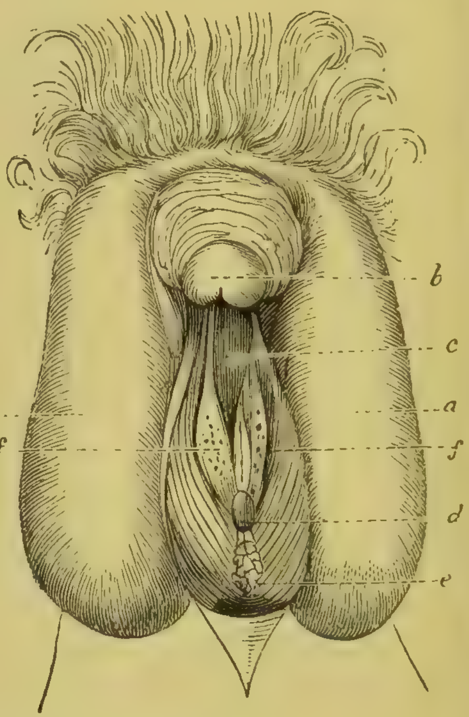


Fig. 317.

Spurious Hermaphroditism (Sir J. Y. Simpson).

Pelvis of a female infant in which the external organs simulated those of a male. *c* uterus and appendages, *b* hypertrophied clitoris with a sulcus, *a* at its extremity, which ended blindly and did not communicate with the urethra.

Case of hypospadias in the male, making the external organs simulate those of the female. *aa* lobes of scrotum; *b* imperforate penis, 1½ inches long; *e* perineal fissures 1½ inches deep, lined with mucous membrane, at bottom of which the urethral orifice *d* is seen: *c* the split urethra, with openings *f* of glands beside it —supposed to be orifices of prostatic ducts, of Cowper's glands, and of seminal canals.

By *false or pseudo-hermaphroditism*, is understood a malformation of the external organs so that they simulate those of the opposite sex. This occurs in two forms. 1. The external organs in the female may simulate those of the male. This is due to a hypertrophy of the clitoris and its prepuce, with approximation of the labia majora (simulating a scrotum) and contraction or occlusion of the ostium vaginæ; in very rare cases is the clitoris perforated by the urethral canal. This condition is seen at fig. 316, which represents the pelvis and external organs of an infant christened as a boy; a post-mortem dissection showed that the sex was female.*

2. The external organs in the male may simulate those of the female; the non-closure of the lower surface of the urethra and perineum, which constitutes hypospadias, produces an appearance resembling the external organs in the female. Numerous cases are on record in which the sex of males has been mistaken, even by medical experts, and the persons have entered married life as belonging to the female sex. The penis may be small and imperforate, the urethra opening at its base; the perineal fissure, lined by mucous membrane, may closely resemble the vagina; and the halves of the scrotum may appear like labia. This condition is seen at fig. 317: the case is reported by Otto;† the person lived in a state of wedlock with three husbands before the true sex was ascertained by medical examination.

Cases of epispadias, in which the urethra (through defect of the upper portion of the penis) is exposed along with a portion of the bladder, would only on hasty examination be mistaken for the external female organs. The exposed vesical mucous membrane with its skin margins resembles the vagina with the labia, but it is situated above the pubis; further, below the penis we find the normal scrotum and testicles.

Diagnosis. In examining a case, proceed as follows. Palpate the supposed labia carefully to ascertain whether testicles are present in them; the possibility of hernia of the ovaries into the labia and of non-descent of the testicle into the scrotum, must be kept in view. 2. Examine per rectum for traces of uterus or ovaries. 3. After puberty watch for the menstrual molimina or hæmorrhage in the female, and for development of sexual powers in the male. 4. Note secondary sexual characters: development of breasts, appearance of face, tone of voice, and inclination towards one or other sex.

Hermaphroditism, like malformations in general, lies beyond treatment.

INFLAMMATION OF THE VULVA (VULVITIS).

Pathology. In the acute stage, the mucous membrane round the ostium vaginæ and urethra is red, swollen and painful. Sometimes what? the mucous glands are obstructed, and a form of acne (?) developes; the glands of Bartholini may inflame and suppurate, producing an abscess about the size of a pigeon's egg; the sebaceous glands at the roots of the hair on the labia majora are sometimes specially affected, producing the 'Folliculite vulvaire' of Huguier. In the chronic stage, there is abundant secretion of creamy purulent matter; when due to gonorrhœa, condylomata (?) form round the vaginal orifice.

---

* Ramsbotham—Medical Gazette, XIII., p. 184.

† Sir J. Y. Simpson—Loc. cit. p. 427.

us

ait,

Etiology. It is often secondary to vaginitis, and accompanies urinary fistula and carcinoma. Want of cleanliness and protracted exercise, specially in hot weather, produce it and that most readily in patients with much adipose tissue. It is sometimes occasioned by awkward coitus and by masturbation. In children, it is not uncommon; it is important to remember this, as the inflamed appearance of the vulva and the profuse discharge make the parents suspect that the child has been attacked and has contracted specific disease. It is caused by irritation of urine, want of cleanliness, and the strumous diathesis; sometimes it takes an epidemic form in the children of a family or district (Sir J. Y. Simpson).

The Symptoms and Physical Signs will be apparent from what has been said under pathology.

Treatment. Strict attention to cleanliness must be enjoined; frequent bathing with warm water and the application of hot linseed poultices will ease pain. In children, the pain in micturition is relieved by its being done while in a warm bath. Sedative lotions such as acetate of lead and opium may be required:—

℞ Tinct. opii. ℥ss.
Plumbi acetat. ʒi.
Aquam ad ℥vi. M.

In chronic cases, frequent washing with 2 per cent sol. of carbolic or with astringent lotion is necessary. In abscess of the glands, the pus is evacuated through the gland ducts on pressure, or by free incision.

PRURITUS VULVÆ.

Definition. An irritable condition of the external genitals producing excessive itchiness.

Pathology. The irritable region is at the upper convergent angle of the labia majora at the mons veneris; it may extend from that over the vestibule and the vaginal orifice, and sometimes over the mons veneris on to the abdomen. The pathological changes in the skin which produce this irritability are not known, because the cases are not seen in an early stage. By the time that the irritation has become so unbearable that advice is sought, the skin is inflamed and excoriated by continued scratching which masks its original condition.

Etiology. Any irritating discharges from the vagina as in carcinoma, and even simple leucorrhœa as from senile vaginitis, may produce it. It occurs in diabetes—due to the irritation of the sugar in the urine (Friedreich)—and in affections of the kidney and bladder, just as similar conditions produce irritation of the penis in man. In children, it accompanies vulvitis and has been traced to the passing of the oxyuris vermicularis from the anus to the vulva. It is also caused by whatever produces congestion of the labia—hence its occurrence at the menstrual period and in early pregnancy—and by irritable skin affections as herpes and eczema of the vulva (Hildebrandt).

Symptoms. The irritation is not continuous but recurs periodically. In some cases, it appears only after taking a long walk or after getting warm in bed; sometimes it is most marked just before the menstrual period. The irritability is slight at first but becomes aggravated by scratching. To obtain this temporary relief, the patient comes to avoid company and this, along with the constant irritation, has led in some cases to nervous depression and melancholia; sometimes the practice of masturbation is learned at the same time, and the consequent nervous symptoms gravely complicate the case.

Diagnosis. As the most hopeful cases for treatment are those in which a distinct removable cause is found, a thorough examination is necessary: (1) Carefully examine the external genitals for irritating skin eruptions or parasites; (2) expose the vagina and cervix thoroughly with the speculum to ascertain whether there is irritating leucorrhœa, the plugging of the vagina with cotton wadding to check discharge from the vagina or cervix will help us to exclude this (Thomas); (3) test the urine for albumen and sugar; (4) examine per rectum for any source of irritation there.

Treatment. We must first remove the cause. When parasites are present, the mercurial or sulphur ointment is required; with vaginal or cervical catarrh, a tampon of wadding and glycerine (with acetate of lead ʒ ii to ℥ i) in the vagina will check the irritating discharge. Attention to diet (which should consist largely of vegetables) and to the regular action of the bowels is necessary; when the gouty diathesis (with which pruritus is often associated in old patients) is present, lithia water is useful. It is a safe rule to forbid all stimulants. Frequent vaginal injections or sponging with warm water, followed by the application of boracic ointment or bismuth, will relieve mild cases; in more severe, the patient should have, several times a day, a warm sitz-bath combined with the douche; after this, iodoform is dusted over the vestibule or, if the patient is recumbent, lint soaked in acetate of lead and opium lotion is laid between the separated labia. In some cases, chloroform and almond oil have given relief (Scanzoni).

℞ Chloroformi ʒii.
Ol. amygdal. ℥ii. M.
Sig. Apply externally as directed.

Preparations of mercury give benefit in other cases.

℞ Hydrarg. perchlor. ʒss.
Aquæ. ℥vi. M.
Sig. Apply externally as directed.

Schrœder has seen very good results from the application of carbolic acid of varying strength—1 to 40 up to 1 to 10. Where milder measures have failed, solid nitrate of silver well rubbed into the irritated parts and followed by cold water dressing has given relief. To procure rest at night, morphia and chloral may be necessary; Hildebrandt has found tinct. cannabis indicæ (m. 10-20) even more effective than these.

ERUPTIONS ON THE VULVA.

The skin round the vulvar orifice may be affected with any of the eruptions found on other parts of the body. Of these the most important are erysipelas, eczema, prurigo, herpes, acne. These eruptions have the same character as when they occur in other situations and their treatment is the same. Condylomata will be referred to under syphilis.

TUMOURS OF THE VULVA.

Under these we shall notice briefly—

Cysts of the Bartholinian glands,
Elephantiasis,
Neuromata,
Fibroma,
Lipoma,
Carcinoma.

This is also the most convenient place to refer to

Pudendal hernia,
Varix, hæmatoma and hæmorrhage.

Cysts of the Bartholinian glands. The Bartholinian or vulvo-vaginal glands, which are the analogue of Cowper's glands in the male, are situated at each side of the ostium vaginæ (see fig. 7); their ducts (about 2 c.m. long and wide enough to admit a fine probe) run upwards to about the middle of the ostium vaginæ, where their mouths may be seen just in front of the hymen.

A cyst may form by dilatation of the *ducts* or of the *glands* themselves. When due to distension of the duct, it has at first an elongated oval form; when the gland itself is affected, there may be multiple cysts or a lobulated swelling. The contents are thick mucus which is clear or of a brownish tinge. Suppuration may occur and abscess form (*v.* fig. 318).

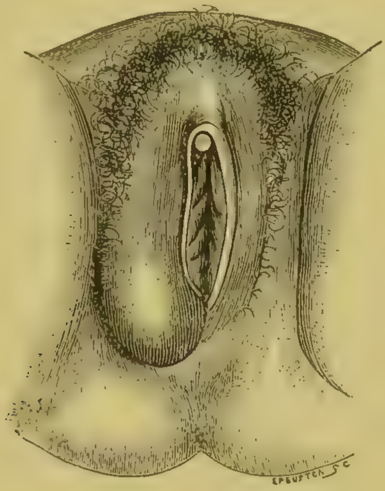


Fig. 318
Abscess of the Bartholinian gland (Huguier).

The symptoms are due to the discomfort of the swelling, which is most felt on walking. The diagnosis is easy, from the position of the swelling and its fluctuating character; when it has developed during the puerperium, we must differentiate it from hæmatoma (which after a time becomes firm from coagulation) and inflammation after injury.

The treatment consists in complete evacuation of the cyst and destruction of its walls. It is not sufficient to open it and allow the fluid to escape; we must cut out a portion of the wall and then plug the cyst with carbolised lint. By far the best instrument is the thermo-cautery: we first puncture the cyst with it; when the fluid has escaped, we pick up the outer cyst wall with forceps and lay it fairly open with the cautery; we then cauterise the inner wall also. A piece of carbolised lint is laid over the wound.

Elephantiasis. This is a common condition in tropical countries, but is comparatively rare in Europe and America although a minor degree of it is occasionally met with.

The pathological changes consist in a dilatation of the lymphatic spaces and ducts, with secondary formation of connective tissue and thickening of the layers of the cutis vera; sometimes the papillæ are specially enlarged, producing swellings which resemble condylomata in form. The labia majora are most frequently affected, next in frequency the clitoris; more rarely are the labia minora hypertrophied (Mayer).

It developes, according to Mayer, most frequently at ages of from 20 to 30 years—that is in the period of sexual activity. It has been traced to direct injury, but the most fruitful cause of minor degrees of hypertrophy is syphilis.

The symptoms are due to the weight and discomfort of the tumour which may reach to the knees.

The treatment of the larger growths is removal with the thermo-cautery.

Neuromata, or exquisitely sensitive red papules which resemble a urethral caruncle, have been described by Sir J. Y. Simpson (see the figure of urethral caruncle); their occurrence, except at the urethral orifice, is extremely rare.

Fibromata. These spring from the labia majora, resemble in structure fibroid tumours of the uterus and, like them, are embedded in cellular tissue or hang down by a pedicle.

Lipomata may arise from the fatty tissue of the mons veneris or labia majora. Emmet* describes a case in which the tumour hung down to the patient's knees and was supported in a bag round the waist; Stiegele† removed one which weighed 10 lbs.

Carcinoma of the vulva is rare in comparison with its frequency in the uterus. The most frequent form is the cancroid (West). It begins, usually on the inner surface of the labia majora, as small round nodules which elevate the skin; they may remain for a long time unnoticed, as their growth is at first slow and painless (Hildebrandt). After ulceration they spread more rapidly, and extend forwards and backwards but rarely into the vagina (Mayer). The inguinal glands are early involved.

Complete removal before the glands are affected, is the only treatment. As the growth is accessible, there seems a prospect of cure; during the last few years cases are reported by Schrœder and others of extirpation without recurrence, but the time elapsed is too short to justify definite conclusions.

Pudendal hernia. This corresponds to scrotal hernia in the male. The round ligaments are the analogues of the spermatic cord, and after emerging from the inguinal canal pass into the substance of the labia majora which correspond to the scrotum; if the process of peritoneum surrounding the round ligaments—known as the canal of Nuck—does not become obliterated at birth, it forms a track for the hernia.

---

* Op. cit., p. 601.

† Zeits. f. Chir. u. Geb., Bd. IX., S. 243.

Though it be very rare, the possibility of a hernia must be kept in mind on examining a tumour of the labia; the crackling feeling, the impulse communicated on coughing, and disappearance on taxis, indicate hernia. The serious consequences of cutting into such a hernia by mistake for an abscess, are self-evident.

Varix. The plexus of veins which forms the erectile tissue of the bulbi vaginæ has been already referred to (*v.* p. 10 and fig. 7). A varicose condition of the veins sometimes occurs in pregnancy and with pelvic tumours. In a case described by Holden,* they formed, when the patient was erect, a tumour of the size of a child's head. When these vessels rupture and the blood is effused into the cellular tissue, a hæmatoma is formed.

Hæmatoma. This condition is also called "Thrombus" and "Hæmatocele" of the vulva; the former term should be limited to a coagulum within a vessel, and the latter to blood effusion into the peritoneal cavity. It arises most frequently during labour, from injury produced by the child's head; the effusion may appear rapidly, as a tumour from the size of a walnut to an orange or larger, or may take place gradually. It has also been known to occur independent of labour or pregnancy, as the result of a blow or violent muscular effort.

The treatment consists in the application of ice to the vulva, and regular evacuation of the bladder and rectum without the patient's being allowed to strain. With this treatment, the mass may be absorbed. Should inflammation occur, poultices are applied and pus is evacuated with the knife; if this occurs in the puerperal condition, special care is required to keep the wound aseptic by repeated washing with carbolic solution and dressing with carbolised lint.

External hæmorrhage from ruptured veins sometimes occurs. The rupture may be caused by muscular straining, or by a blow or wound of the vulva. The dilated state of the veins makes such an injury serious during pregnancy, and several cases of a fatal result from a blow or kick have been the subject of criminal prosecution (Sir J. Y. Simpson). In a case recorded by Hyde,† hæmorrhage from a vein ruptured by a fall proved fatal in forty minutes. Those who suffer from varicose veins should be recumbent for some hours during each day; should a vein rupture, the patient must lie down at once and apply pressure to the bleeding point.

---

* Immense vulvar and vaginal Varix: N. Y. Med. Record, July 1868.

† Lond. Obst. Trans., Vol. XI.

CHAPTER XLVI.

RUPTURE OF THE PERINEUM AND ITS OPERATIVE TREATMENT.

LITERATURE.

Bantock, G.—On the Treatment of Rupture of the Female Perineum, Immediate and Remote : London 1878. *Duncan, Matthews*—Papers on the Female Perineum : Churchhill, London 1879. *Goodell*—Lessons in Gynecology : Philadelphia 1880. *Hart, D. B.*—Op. cit. *Hildebrandt*—Die Krankheiten der äusseren weiblichen Genitalien : Stuttgart, 1877. *Schrœder*—Op. cit., s. 512. *Simpson, Sir J. Y.*—Diseases of Women, p. 644. *Thomas*—Op. cit., p. 165. See *Duncan* and *Hildebrandt* for literature.

Nomenclature. It will be most convenient to retain the nomenclature already used in the section on anatomy. The pelvic floor is made up of pubic and sacral segments, as already defined ; in labour, each of these behaves characteristically—the pubic segment is drawn up, the sacral one driven down.

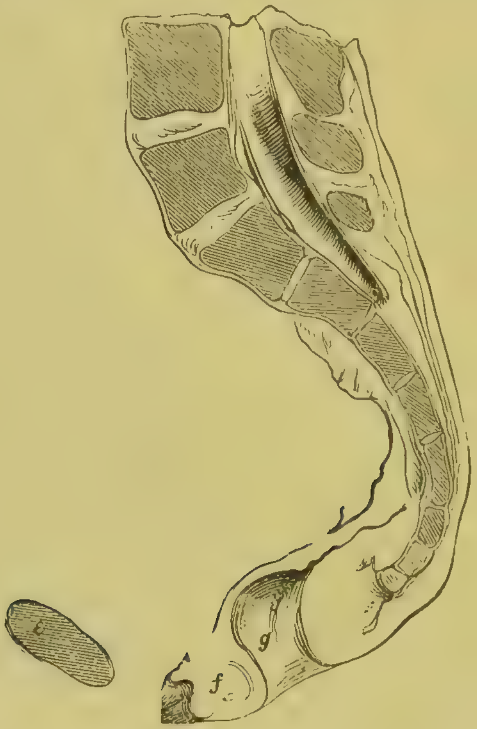


Fig. 319.

The sacral or supporting segment of the pelvic floor (Hart). *e* symphysis pubis ; *f* perineum or inferior angle of sacral segment ; *g* anus.

In this chapter we are specially concerned with the sacral segment. During parturition it is driven downwards and backwards by the advancing fœtus and is more or less torn at its inferior angle. The term perineum is often vaguely applied; in this chapter, however, the perineum is defined as *the inferior angle of the sacral segment* (*v.* p. 56). Fig. 319 shows the perineum. At its lower end, this part of the pelvic floor is made up of the following :—

1. Posterior vaginal wall,
2. Hymen,
3. Fossa Navicularis,
4. Fourchette,
5. Perineal body and skin over its base.

These are mesial structures; laterally, we have the labia majora and minora.

PATHOLOGY AND VARIETIES.

It should be kept in mind that the vaginal orifice is transverse, the vulvar orifice antero-posterior.

When the fœtal head is passing through the vaginal orifice, it distends it all round; while, when passing through the vulvar orifice, it distends the lower half of this only, *i.e.*, it does not stretch those parts of the vulva lying above the level of the meatus urinarius.

As the result of normal and abnormal childbirth, we get certain tears of the inferior end of the perineum. In all primiparæ there is at least one laceration of the vaginal orifice, usually mesially and posteriorly—the "inevitable laceration" of Matthews Duncan. There may be also laceration of the following structures: (*a*) of the vaginal orifice, radiating; (*b*) of vestibule; (*c*) of fourchette; (*d*) of labia minora; (*e*) of perineal body to a varying depth, the most extensive involving the sphincter ani. Further, there is sometimes central rupture of the perineum. In this lesion, the skin over the base of the perineal body alone may be involved or only the vagina may be torn. Rarely is it a lesion of vaginal wall, connective tissue, and skin, with an unruptured band of tissue between it and the fourchette (fig. 320); this, therefore, is a perforation through the inferior angle of the thinned-out sacral segment.

ETIOLOGY.

The following causes produce rupture in parturition :—

(1) Passage of a large head or of an occipito-posterior rotated into sacrum, passage of the shoulders;

(2) Narrowness of pubic arch;

(3) Straightness of sacrum, as in flat or rickety pelvis;

(4) Syphilitic ulceration;
(5) Rigidity of parts in elderly primiparæ;
(6) Careless use of forceps;
(7) Too early passage of hand into vagina to bring down arms in turning.

Comment on these would lead us too much into Obstetrics.

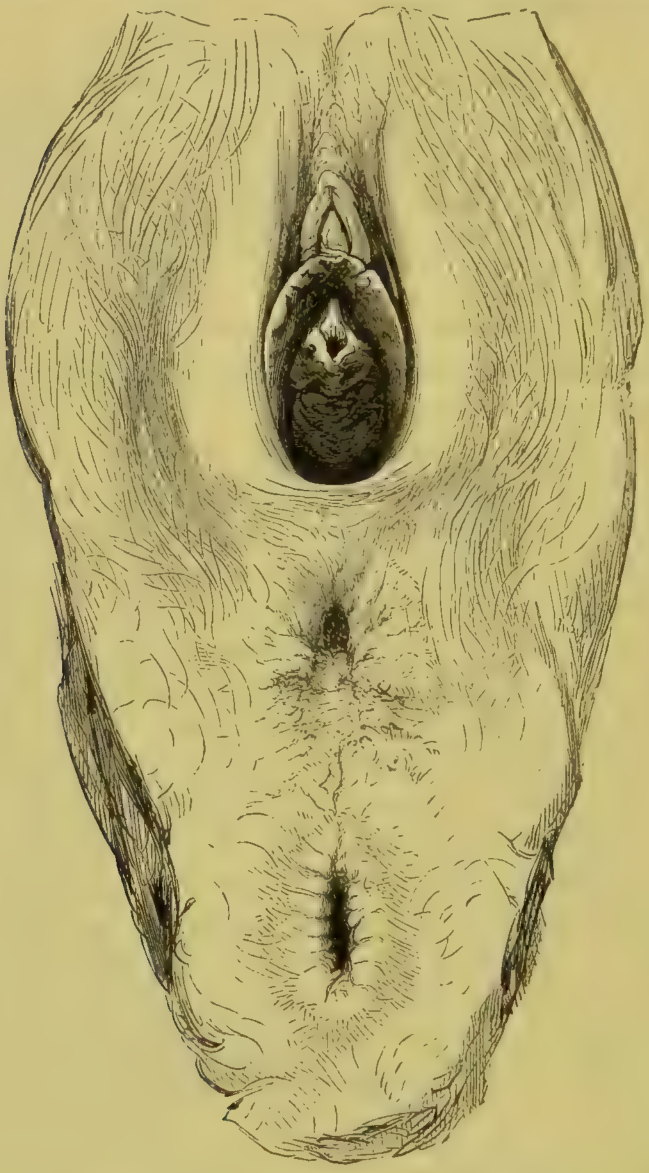


Fig. 320.

Central rupture of the perineum, the child was born not through the vulva but through the ruptured opening (Sir J. Y. Simpson).

TREATMENT.

We take this up under the following heads:—

a. Prophylactic;
b. Operative, immediate and deferred.

a. Prophylactic. This properly belongs to midwifery. The obstetrician is too apt to think of the perineum as something that delays the exit of the fœtal head, and to forget the gynecological aspect—that it is the supporting segment of the pelvic floor. Extensive tear of this during labour means not only a larger raw surface for septic absorption, but also is one factor predisposing to prolapsus uteri. The question, therefore, of *support of the perineum* during parturition comes up here for consideration. To understand this we must keep in mind that the fœtal head, in passing through the outlet, drives the sacral segment back and glides forward in a direction parallel to the driven-back posterior vaginal wall. The normal curve of the sacrum favours this latter motion.

The perineum may tear (1) from over-distension of the orifice, or (2) from the too forcible driving of the fœtal head against it, *i.e.*, at right angles to the perineum. If, therefore, while the head is crowning and rupture threatening, the palm of the hand covered with a napkin be placed on the skin aspect of the perineum, we can by gentle support keep the head flexed, retard its progress somewhat, and elongate the perineum towards the pubic arch.

In addition the practitioner can materially help in preventing an awkward tear by the preliminary free inunction with medicated vaseline of the head, vagina and skin of perineum, and by tucking in the anterior vaginal wall when projecting too much over the occiput.

Goodell passes two fingers into the rectum and restrains the head with the thumb. The perineum should never be forcibly supported as this damages the vestibule. As regards the use of forceps, the authors have been struck with the fact that with axis-traction forceps the head can be brought over a rigid perineum with a minimum amount of tear.

b. Operative treatment; (1) immediate, (2) deferred. No practitioner should leave a labour case until he is satisfied, by actual inspection or digital examination, as to the amount of perineal tear. When the sphincter ani is involved, the operation is on no account to be deferred but must be performed at the conclusion of the third stage. The practitioner should never run the risk of his patient's having incontinence of fæces.

(1.) *Immediate operation.* When *the perineum is torn* to the edge of the anus, it is stitched as follows. Wait until the third stage is completed. The patient lies on the left side with the knees drawn up.

Chloroform need not be given unless the patient insists on it. The raw surface is sponged with 1-40 carbolic lotion, and all bleeding arrested (usually by pressure). The tear has probably split the perineal body vertically and mesially, so that there is a triangular raw surface on each side continuous along the posterior side; the skin over the base of the perineal body forms the second side of each triangle, while the third is vaginal. By means of a fully curved needle armed with coloured silk-worm gut, stitches half-an-inch apart are passed as deeply as possible on the skin aspect of the perineal body; the same is done on the vaginal aspect although this is not always necessary. The vaginal stitches are tied first, and then the skin ones. Silver wire may be used in place of silk-worm gut. The patient's knees are kept tied together, and, if necessary, the urine drawn off by catheter for the first few days.

When the *sphincter ani is torn*, the stitches are passed just as before. The rectal sutures (catgut) are passed first, then the vaginal, and lastly the skin ones; the rectal ones are probably unnecessary.

The patient's food must be liquid, and the bowels should be kept confined for eight or nine days. Castor oil is then given; the nurse must be instructed to inject oil when the bowels are about to move, and to break up and assist the passage of scybala. Some operators recommend that the bowels be moved every day by small doses of castor oil—a plan worth trying.

The stitches are removed on the 8th or 9th day. The silk-worm gut irritates very little; in one case where a perineal stitch was overlooked, it gave no trouble in subsequent coitus and pregnancy. It was detected at parturition 10 months after and removed, when it was found to be quite unaltered; it had caused no irritation.

(2.) *Deferred operation.* This may be simply to repair the perineal body, or to operate for a rupture through the sphincter. The former will be considered under prolapsus uteri. At present we take up the operation for restoration of the ruptured sphincter ani.

Diagnosis of long-standing rupture of perineum into anus. The patient complains of inability to control the passage of flatus or of fœcal matter when a call to stool happens; she is especially troubled when diarrhœa is present. Sometimes there is a certain amount of control, when some of the fibres of the upper margin of the sphincter are intact. A patient in the lower classes occasionally treats her unpleasant condition as of little moment; to a woman of any refinement, the condition is a most distressing one.

On inspection, the practitioner notes that the skin surface between the vaginal and anal apertures is gone, so that these apertures are blended. The finger passed into the rectum feels no muscular constriction, and notes that the anterior and posterior rectal walls are in contact. The perineal body appears to be gone, and a V-shaped projection of cicatrised mucous membrane (apex above) is all that remains of it.

If the edges of this V-shaped projection be pared and stitched, the function of the sphincter is restored.

Operation for restoration of function of sphincter ani. The patient's bowels are first freely cleared out by castor oil and enemata so as to ensure that no scybala remain.

The instruments requisite are the following:—

Straight knife,
Two pairs of artery forceps,
Dissecting forceps,
Catgut ligatures,
Silkworm gut or Silver wire,
Scissors,
Operating douche,
Fully curved needles, large and small,
Needle-holder.

The patient is chloroformed and placed opposite a good light in the lithotomy posture. The knees are held by assistants as follows. Each stands facing the light, and places a knee of the patient under the armpit next to it; with the hand of the same arm, he exercises tension on the labium majus as the operator wishes. With his other hand, the assistant controls the patient's foot.

The stages of the operation are—(1) Making raw the mucous edges, (2) Applying the stitches.

The mucous edges may be made raw in two ways: (*a*) by splitting each edge with its constituents of rectal mucous membrane and vaginal mucous membrane, as introduced by Dr John Duncan, Edinburgh; (*b*) by paring each edge with scissors.

The former is preferable and is performed as follows. Our aim in operating is threefold; to close the anterior wall of the rectum, to close the posterior wall of the vagina, to construct a new perineal body between.

The incisions, as made by A. R. Simpson, are shown in fig. 321. An incision is carried from the end of the septum (between the rectum and vagina) outwards on the inner surface of the labium to the point 1; a second incision is made from the point *a* parallel to the vulvar outlet, passing through the outer extremity of the first incision to *b* at the end of the torn sphincter. This is done on both sides.

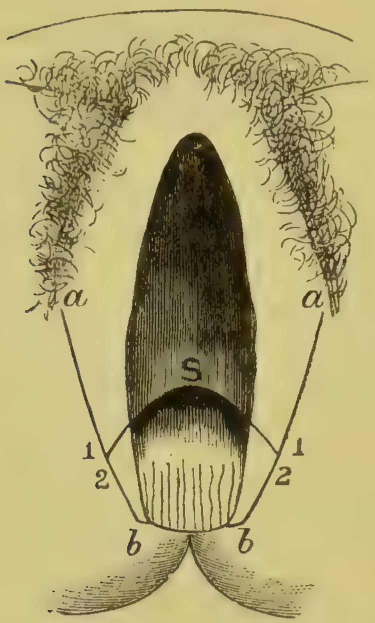


Fig. 321.

Lines of incision in operation for repair of rupture of perineum through sphincter ani. For letters, see text.

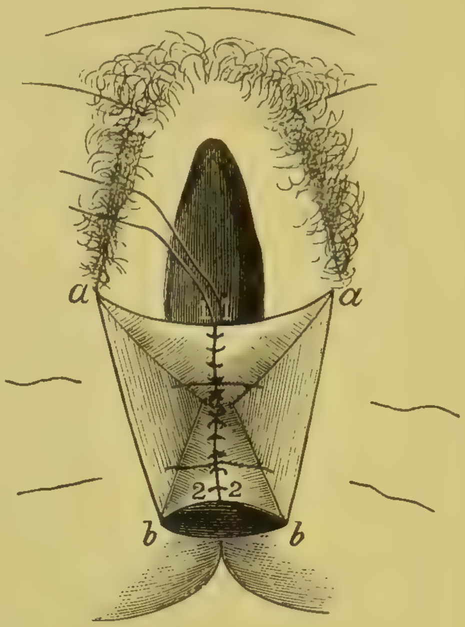


Fig. 322.

Passing of sutures in same operation. For letters, see text.

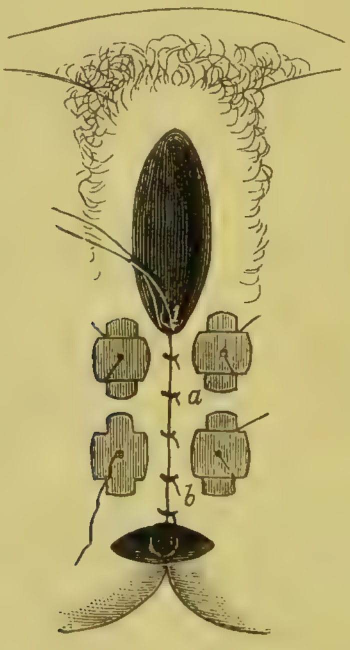


Fig. 323.

Result of same operation.

The two triangular flaps thus formed are dissected off as shown at fig. 322. The flaps *a* 1 *s* are turned forwards to the vagina on each side to meet one another, so that the corners marked 1 in fig. 321 take the position 1 in fig. 322; the flaps *b* 2 *s* are turned backwards to the rectum, so that the corners 2 (fig. 321) meet at 2 in fig. 322.

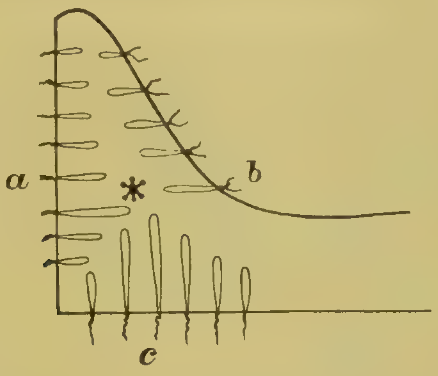


Fig. 324.

Position of sutures as seen in section, *a* skin of perineum, *b* vagina, *c* rectum (Hildebrandt).

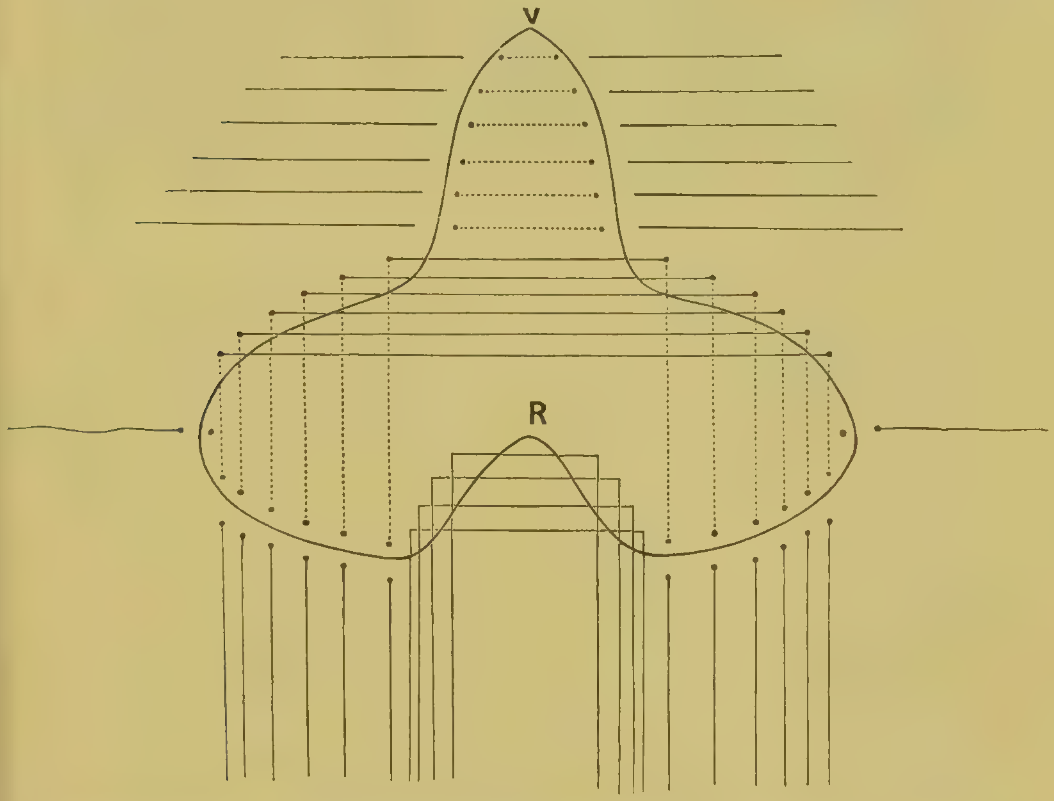


Fig. 325.

To show direction of sutures in operation for prolapsus uteri with complete rupture into rectum; *V* apex of raw surface in vagina, *R* in rectum (Hildebrandt).

Introduction of stitches. The vaginal flaps are stitched with wire or silk, care being taken to knot the threads *on the vaginal side* of the flaps; the sutures are left long so as to protrude at the vaginal orifice (fig. 322). The rectal flaps are stitched with catgut, knotted *on the rectal side* of the flaps, and cut short.

We have thus closed in the vagina and rectum; the sides of the pyramidal-shaped raw area, thus formed, have to be brought together to construct the perineum. Two deep sutures are passed as in fig. 322; they are of strong wire and are entered at a little distance from the skin edge. Bleeding, which can be checked by a stream of very hot water, should have ceased before we tighten up these sutures with button-plates (fig. 323). Finally, superficial sutures bring together the skin edges which form the raphe of the new perineum along the line 1 *a b*. The result is seen at fig. 323.

Hildebrandt draws attention to the risk of the collecting of discharge at the centre of the new perineal body indicated by the asterisk in fig. 324. He thinks this is diminished by passing the sutures as in fig. 325; the perineal ones are passed into the skin margin of one side posteriorly, out through the skin margin anteriorly, entered again through opposite skin margin anteriorly and brought out again on same side posteriorly. The central space is thus constricted in a ring-like manner.

CHAPTER XLVII.

DISPLACEMENTS OF THE PELVIC FLOOR: PROLAPSUS UTERI; VAGINAL ENTEROCELE.

LITERATURE.

Duncan, Matthews—Papers on the Female Perineum: Churchill, London, 1879. *Emmet*—Op. cit., p. 367. *Freund, W. A.*—Arch. f. Gyn., Bd. VI., p. 317. *Fritsch*—Die Lageveränderungen der Gebärmutter, Billroth's Handbuch. *Goodell*—Op. cit. *Hart*—Op. cit. *Hegar and Kaltenbach*—Operative Gynäkologie, 1881. *Huguier*—Mémoire sur les Allongements Hypertrophiques du Col de l'Utérus: Paris, 1860. *Legendre*—De la chûte de l'Utérus. *Schrœder*—Op. cit., S. 166. *Schultze*—Die Pathologie und Therapie der Lageveränderungen der Gebärmutter: Berlin, 1881. *Schutz and Spiegelberg*—Arch. f. Gynäk., Bd. XIII. *Sims, J. M.*—Uterine Surgery. *Thomas*—Op. cit., p. 168. *Veit*—Klinische Untersuchungen über den Vorfall der Scheide und der Gebärmutter: Zeits. f. Geb. u. Gyn., Bd. I. *Winckel*—Die Pathologie der weiblichen Sexualorgane: Leipsig, 1880. See Fritsch for additional literature.

PROLAPSUS UTERI.

STRUCTURAL AND ANATOMICAL PRELIMINARIES.

WE have already considered (Chap. III) the structural anatomy of the pelvic floor, and therefore now briefly allude to only one or two points. The sacral segment is the supporting one, the pubic segment the displaceable one. If fig. 35 be looked at, the following points can be noted:—

(1) There is the pyramidal interspace behind the pubis, filled up with the retropubic fat;

(2) There is loose tissue between the anterior rectal and posterior vaginal wall;

(3) There is loose tissue between bladder and anterior vaginal wall.

This may be otherwise stated under this generalisation—those organs in the pelvic floor (*viz.*, bladder, urethra and rectum) containing unstriped muscular fibre which enables them to diminish their lumen, are surrounded entirely or partially by loose tissue.

The pelvic floor has been constructed quà parturition, rectal and vesical functions, and intra-abdominal pressure. From the loose tissue surrounding the bladder and rectum, evidently introduced to allow of their contraction, we get weak lines of cleavage in the pelvic floor at which it separates or becomes dislocated under increased intra-abdominal pressure. Thus strong pressure applied to the pelvic floor will cause it to bulge and displace all in front of the anterior rectal wall.

The student will recall (fig. 15) the division of the cervix into intra-vaginal, intermediate, and supra-vaginal portions.

SYMPTOMS AND PHYSICAL SIGNS.

The discomfort caused by the protrusion and the excoriation of the parts is the prominent symptom. The patient complains of "something coming down in front." Further, there is difficulty in micturition.

The physical signs are distinct. If the prolapsus be *incomplete*, a portion of the anterior vaginal wall has passed out at the vaginal orifice, the os uteri is equally displaced downwards, and the posterior fornix is apparently deeper from the descent of the cervix. The uterus, in addition to being low down, is usually enlarged; it lies with its axis coinciding with that part of the pelvic curve in which it is. If the prolapsus be *complete*, we find the whole anterior vaginal wall outside, the cervix extruded, and the posterior vaginal wall everted (fig. 171). The student must specially note that this description is based on *clinical* observation.

From the *study of frozen sections*, we further learn that the posterior vaginal and anterior rectal walls are separated by peritoneum driven in between them, and that the uterus with other parts has become hypertrophied through long-standing congestion.

MECHANISM OF PROLAPSUS.

The displaced organs can be replaced—posterior vaginal wall first, then uterus, and lastly pubic segment; on the patient's straining, the mechanism of the displacement is repeated and is seen to be perfectly definite and to occur as follows.

We have first the appearance of the anterior vaginal wall, from below upwards, at the orifice. *Pari passu* with its descent, the uterus and posterior vaginal wall have come down; its lowest point tracing out the pelvic curve, while the uterus becomes more and more inclined backwards until at the vaginal orifice it lies in the vaginal axis; the posterior vaginal wall forms a pouch, the depth of half its own length, behind it. Finally, the uterus is driven outside; the os sweeps upwards and forwards, and the posterior vaginal wall is now completely everted—its lowest part appearing last.

On vertical section, we now find these conditions:—(1) Almost complete extrusion of the anterior or pubic part of the floor, the upper and anterior part of the bladder still behind the symphysis; (2) Complete extrusion of the uterus, which sometimes lies with the fundus below the level of the anus; (3) Rectum in position and only posterior vaginal wall down, the latter has peeled from the rectum downwards as far as the lowest inch-and-a-half (of close connexion) which is elongated (fig. 326).

The *explanation of this mechanism* is as follows. The displacement in prolapsus uteri is caused by intra-abdominal pressure, pushing down that part of the pelvic floor which lies in front of the anterior rectal wall. This part consists of pubic segment, uterus, and posterior vaginal wall. The posterior angle of the pubic segment is attached to the cervix uteri, and the cervix uteri to the top of the posterior vaginal wall. Thus, when intra-abdominal pressure is excessive, this part when driven down must have the following sequence of protrusion at the vaginal orifice: (*a*) Anterior vaginal wall from below upwards; (*b*) Os uteri; (*c*) Posterior vaginal wall from above downwards.

The uterus, while it is being forced down, has the *direction of its long axis* continually altering. This is often expressed by saying that the uterus becomes more and more retroverted as it is forced down. The real fact is, that, as the pubic segment is forced down, it is stretched—chiefly on its peritoneal aspect. In this way tension is made on the cervix uteri, with the effect of throwing the fundus back and making it rest on the retrojacent structures. As these have (roughly speaking) the pelvic curve, we get the uterus in this way constantly altering its axis-lie.

The *enlargement* is not purely cervical; but affects the whole uterus, the pubic segment, and the posterior vaginal wall. This enlargement is a *consequence* of prolapsus uteri, and not a factor in its production. If we view a prolapsed uterus (with the os at the ostium vaginæ) through the pelvic brim, it can be seen that it lies, as it were, at the bottom of a valley—the sides of the valley being the broad ligaments, the bed of the valley the uterus. The parts of the uterus do not lie on the same horizontal plane, the cervix lies low. It is thus evident that the venous supply of the uterus, having a mechanical disadvantage to its return, will have a tendency to stasis which will be most marked at its cervical end. This may lead to areolar hyperplasia at first, and, so far as our present knowledge goes, accounts for the increased size of the uterus in prolapsus.

DIAGNOSIS AND DIFFERENTIAL DIAGNOSIS.

The diagnosis is made by noticing the relations of the parts extruded and by passing the sound if necessary into the bladder and uterus.

The differential diagnosis must be made from the following conditions.

(1.) *Hypertrophy of the infra-vaginal portion of the cervix;*
(2.) *Hypertrophy of middle portion of cervix.*

For both of these conditions the student is referred back to page 258 (see figs. 161, 169, 170).

(3.) *Cystocele.* Uterus is in position, and displacement is found to be due to bulging back of posterior wall of bladder.
(4.) *Rectocele.* The finger, passed through the anus, can be pushed into the pouched rectum.
(5.) *Inversion and polypus* (*v.* pp. 363 and 420).

ETIOLOGY.

The factors producing prolapsus uteri are three in number:—(1) *Deficient sacral support;* (2) *Deficient tone of pubic segment of pelvic floor;* (3) *Intra-abdominal pressure.*

Deficient sacral support. By this is meant that through parturition the sacral segment has become straightened out or deficient at its lower margin—the perineum. It is wrong to imagine that tear of the perineum is everything in prolapsus uteri; the perineum may be considerably torn and yet, if the sacral segment is still sufficiently curved and the intra-abdominal pressure not too great, there will be no prolapsus. Tear of the perineum diminishes the sacral support, and deficient sacral support makes the task of intra-abdominal pressure easier. The bearing of the *second* and *third* factors is sufficiently evident. Of all the three, increased intra-abdominal pressure is the most important and is sufficient to cause prolapsus even in virgins. The first and second are adjuvant.

A dispute still exists as to the etiology of prolapsus uteri; some gynecologists assert that the perineal tear has little or nothing to do with it.

NATURE.

The uterus has nothing to do with prolapsus. It is a time-honoured term, but a misleading one. Prolapsus uteri is really *a hernia;* and is analogous in every point to what we term a surgical hernia (such as femoral hernia).

Thus it has (1) a *sac,* the peritoneum; (2) a definite road to travel along, whose boundaries are—*a.* in front the pubic symphysis, *b.* behind the portion of the sacral segment of the pelvic floor from anterior wall of rectum back to sacrum, *c.* side walls; (3) definite coverings, viz., *a.* pubic segment of pelvic floor, *b.* the uterus, *c.* posterior vaginal wall. Like all herniæ, its sac contains small intestine (fig. 326).

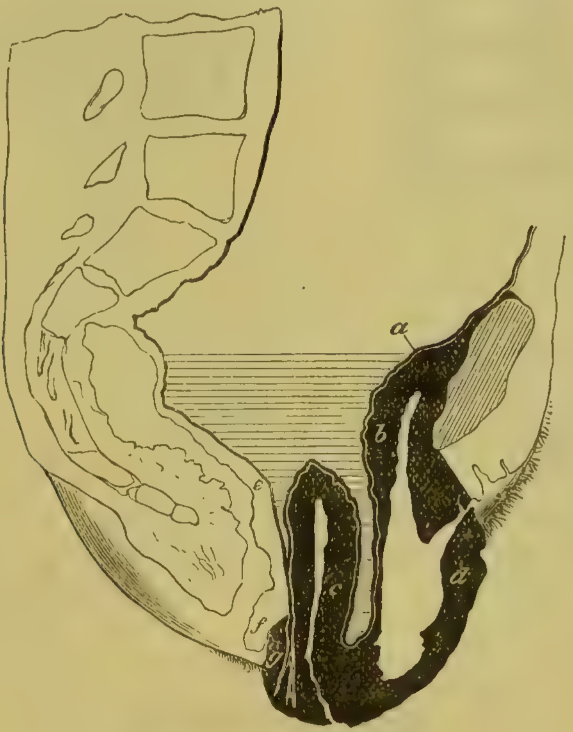


Fig. 326.

To show the hernial nature of prolapsus uteri: *a* peritoneum: *b* bladder; *c* uterus; *d* anterior vaginal wall: *e* anterior rectal wall; *f* perineum; *g* posterior vaginal wall. The dark portions are the coverings of the Hernia (Hart).

Huguier alleged that, by a hypertrophic elongation of the supravaginal portion of the cervix, the bladder and posterior vaginal wall were displaced downwards; and that many cases of alleged prolapsus uteri are really due to this. Such cases differed from prolapsus uteri in the fact that the fundus uteri and fundus of bladder are in position. Many gynecologists hold this view of Huguier, most of them modifying it somewhat. Schrœder's handbook, Goodell's gynecology and Hart's structural anatomy may be consulted on this moot point.

TREATMENT.

A. Treatment by Pessaries,
B. Treatment by Operation.

A. Treatment by pessaries. In slight cases, where the anterior vaginal wall protrudes only a little, we may use an Albert Smith or

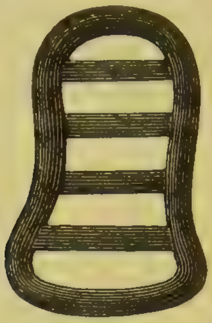


Fig. 327.
Greenhalgh's Pessary, with transverse bars.

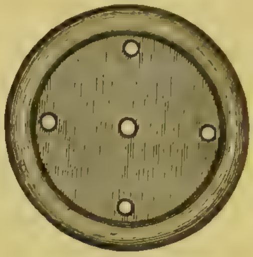


Fig. 328.
Ring Pessary with diaphragm

Hodge pessary with or without transverse bars at the lower part. If this fails, a ring pessary with spring inside should be tried; this instrument is useful here, inasmuch as it is shorter vertically than the Albert Smith and therefore does not project over the lower end of the shortened posterior vaginal wall. The instrument may be made of vulcanite, block tin, or indiarubber. The indiarubber forms are best, and should be provided with a perforated diaphragm.

The pessary is taken in the right hand, and compressed between the finger and thumb as in fig. 329 while it is being passed through the vaginal orifice; the labia are separated with the fingers of the left hand.

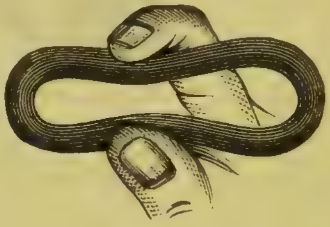


Fig. 329.
Simple elastic Ring Pessary, compressed between the fingers for introduction (de Sinéty).

If the ring instrument fail, then one of the so-called anteversion pessaries, such as that shown in fig. 331, may be tried. Fig. 332 shows Zwanck's pessary, a bad form. In very bad cases and in old women where an operation is out of the question, the patient or her friends should be instructed how to pack the vagina with marine lint; the packing, if thorough, may remain *in situ* for a week. Some recommend pessaries which are attached externally to an abdominal belt. When there is much congestion and excoriation, rest in bed with the use of alum injections (ʒi to Oi) and application of boracic or zinc ointments to the raw surfaces, is indicated.

If the patient has good abdominal development, an abdominal belt will be of use; when applied, it should be fairly tight at the lower edge and slack at the upper one.

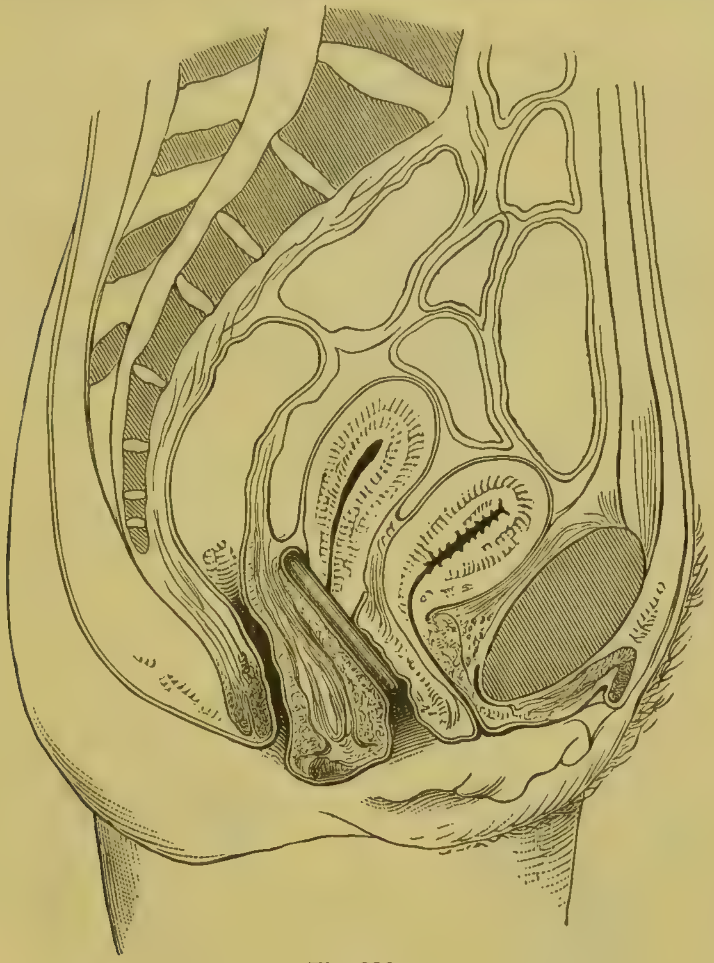


Fig. 330.
Ring Pessary in situ (Hart).

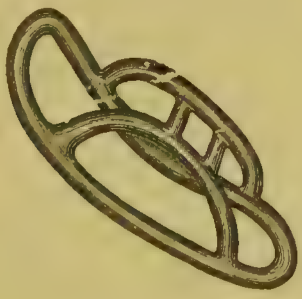


Fig. 331.
Pessary for prolapsus.

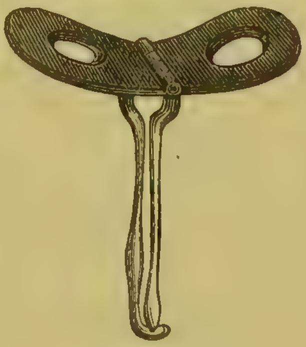


Fig. 332.
Zwanck's Pessary for prolapsus.

B. Treatment by operation. We must first consider *the status quo* in an advanced prolapsus. There are the following primary and secondary lesions.

Primary
- (1) Perineal body usually torn;
- (2) Increase of intra-abdominal pressure;

Secondary
- (3) Congestion of uterus, pubic segment, and posterior vaginal wall;
- (4) Separation of anterior rectal and posterior vaginal walls, with peritoneum clothing their surfaces.

These secondary lesions, especially the last, are serious and incurable. In order to restore the pelvic floor to its pristine state we should require (1) to repair the perineal body, (2) to restrain increased abdominal pressure; these are possible: (3) to do away with congestion and areolar hyperplasia is probably beyond our powers, while (4) to bring about adhesion of the anterior rectal and posterior vaginal walls is impossible. *Prolapsus uteri is therefore a condition with serious and irremediable secondary results.*

The varieties of operative treatment practised are as follow:—

1. Repair of Perineum;
2. Repair of Perineum and paring of mucous membrane of posterior vaginal wall;

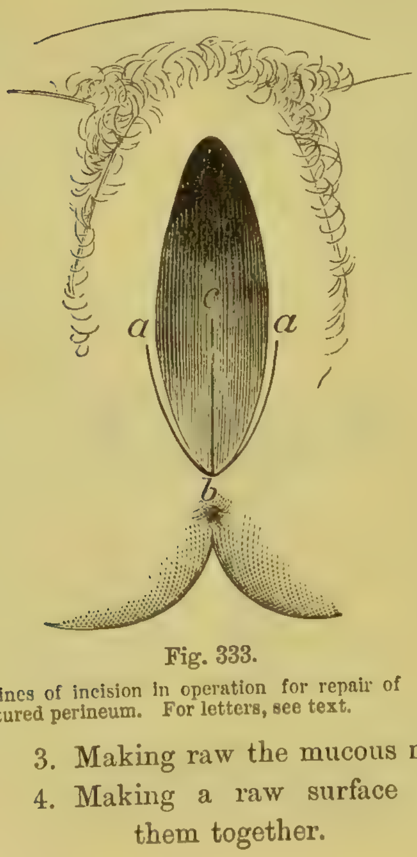


Fig. 333.

Lines of incision in operation for repair of ruptured perineum. For letters, see text.

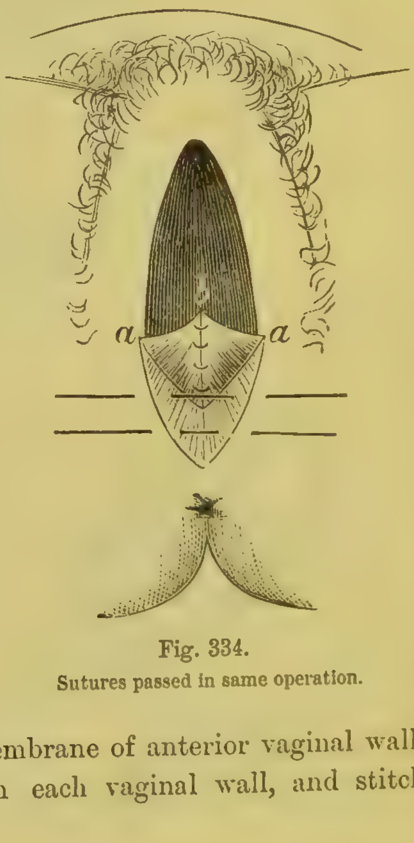


Fig. 334.

Sutures passed in same operation.

3. Making raw the mucous membrane of anterior vaginal wall;
4. Making a raw surface on each vaginal wall, and stitching them together.

Along with these, the vaginal portion of the cervix may be amputated.

1. *Repair of Perineum.* A mesial incision is made from *b* to *c* along the posterior vaginal wall and ruptured perineum; a lateral one is carried forward on each side from the point *b* to *a* along the inner surface of the labium minus. The triangular flaps thus formed are dissected upwards so that their corners *b* (fig. 333) lie as in *b* (fig. 334); they are united with silk or wire sutures knotted on *the vaginal side.* Two deep sutures are passed as in fig. 334 to close in the sides of the raw area left by the flaps; the skin edges are united by superficial sutures. The result is seen at fig. 336.

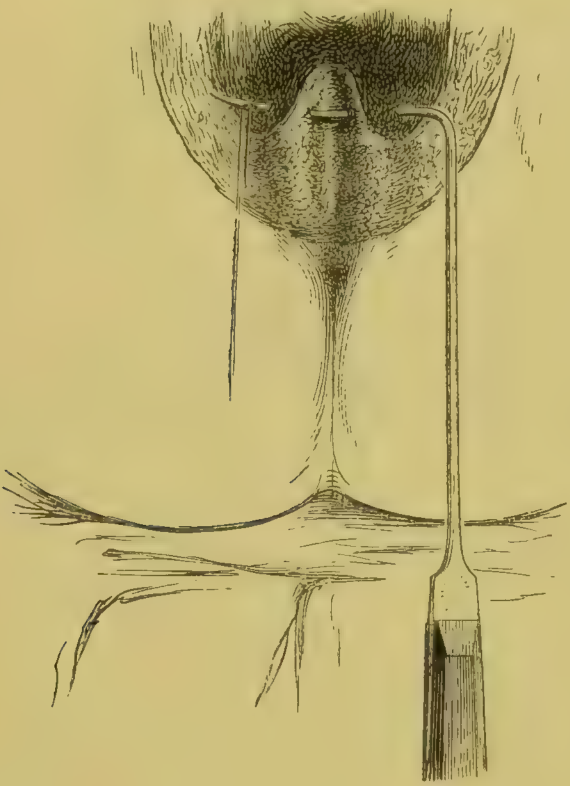


Fig. 335.

Needle carrying in stitches for repair of the perineum (Sir J. Y. Simpson).

2. Repair of Perineum and PARING of mucous membrane of *posterior vaginal wall.*

Fig. 337 shows the various forms of raw surface made by different gynecologists; the operation is a complicated one, especially the stitching.

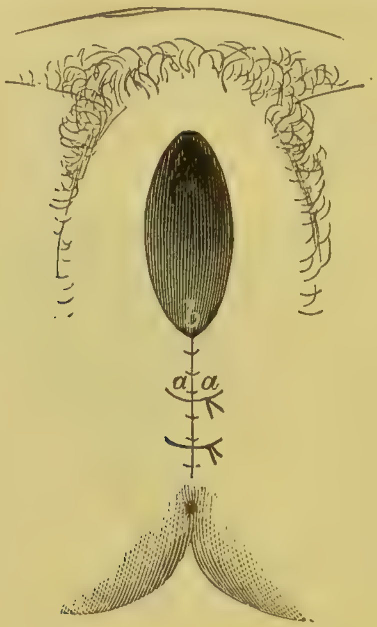


Fig. 336.
Result of same operation.

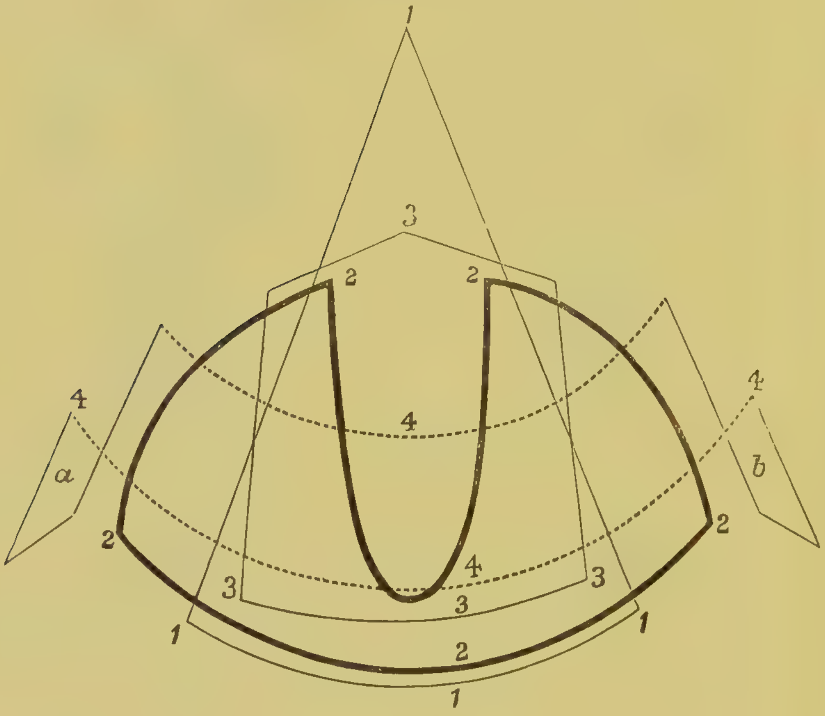


Fig. 337.
To show various forms of raw surface made on posterior vaginal wall in operation for prolapsus uteri: 1111, Hegar's; 2222, Bischoff's; 3333, Simon's; 444*ab* Winckel's (Winckel).

Fig. 339 shews Martin's raw surface, and the relations of the parts when stitched.

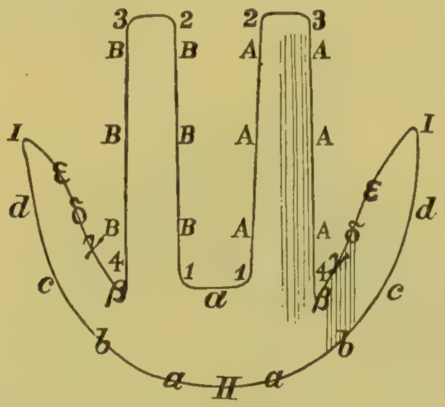


Fig. 338.

Raw surface as made by Martin. 1 2 3 4, raw surfaces on posterior vaginal wall; I II, raw surface round introitus. The surfaces 1-4 are united, A to A and B to B. The edge 4 β is turned in, with the corresponding one of opposite side, along the line *a*. The surface I II, is united by sutures, so that the English and Greek letters are in opposition.

3. *Making a raw surface on mucous membrane of anterior vaginal wall.* The raw surface made by Sims is seen at fig. 339.

4. *Making a raw surface on both vaginal walls, and stitching these surfaces together.*

These raw surfaces can be made with knife or scissors. Care should be taken to avoid all excavation of tissue. Just so much tissue is to be removed as will give a rawness.

The result of any of these operations is not perfectly satisfactory. All of them aim at cicatrisation of the vaginal walls, and do nothing towards the amendment of the serious secondary results already described. When union by first intention is secured, there is risk that the cicatrix may stretch and the prolapse recur.

When the vaginal portion of the cervix is hypertrophied, it may be amputated at the same time.

Of all the raw surfaces recommended, Hegar's is probably the best and simplest.

If supravaginal elongation of the cervix causes a lesion like prolapsus uteri, prolapsus is an irremediable lesion inasmuch as the proper treatment is excision of the cervix up to the level of the os internum. If the student looks at figs. 169 and 170 he will see what this operation involves.

We would therefore sum up as follows. *The displacement of the pelvic floor—where pubic segment, uterus and posterior vaginal wall are driven* *down with the characteristic mechanism given at page 522, and where the serious secondary lesions of uterine enlargement and separation of the anterior rectal and posterior vaginal walls ensue—is a hernia ; there is not sufficient evidence that this precise displacement is a hypertrophic elongation of the supra-vaginal portion of the cervix.*

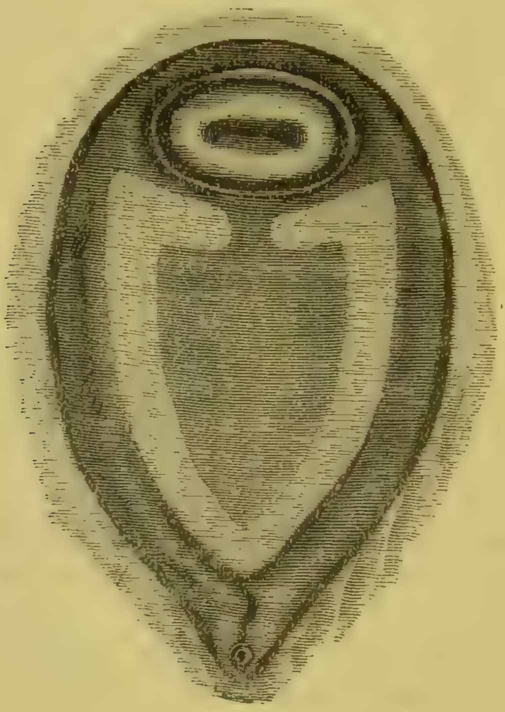


Fig. 339.

To show raw surface as made by Sims (Marion Sims).

Whether a gynecologist adopts Huguier's or the hernia theory, he usually operates as if the latter were the true one.

VAGINAL ENTEROCELE.

Of this there are two forms, *anterior* and *posterior.* Excessive intra-abdominal pressure usually displaces all of the pelvic floor that lies in front of the anterior rectal wall. Occasionally, but very rarely, intestine is forced down between the posterior aspect of the bladder and upper part of anterior vaginal wall, or between the anterior rectal and posterior vaginal walls (fig. 340). We thus get a mass bulging into the vagina, but only affecting one wall ; the uterus and cervix remain in position. This distinguishes it from prolapsus uteri and cervical elongation ; by rectal examination, the posterior form of *enterocele* can be easily distinguished from rectocele.

The *causation* is not well known. In the posterior form, a deep dip of the peritoneum behind the posterior vaginal wall may have existed; but of this there is no evidence.

Treatment. If an ordinary Albert Smith or anteversion pessary fail, an operation may be tried. In the posterior vaginal enterocele, for example, the protrusion should be replaced; a raw surface is then made on the posterior lip of the cervix and a portion of the posterior vaginal wall about its middle; these surfaces are then stitched.

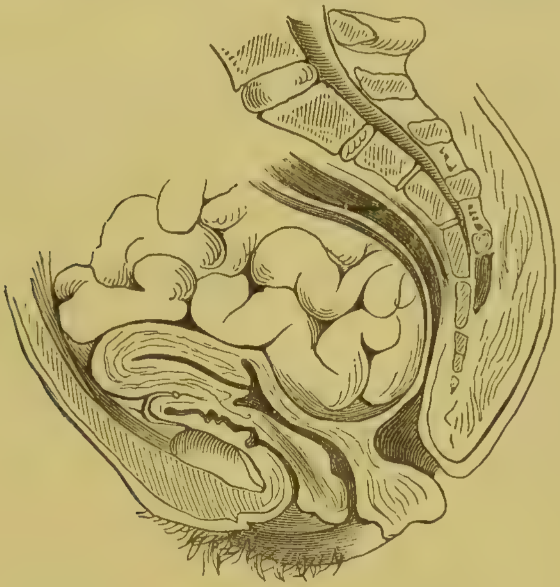


Fig. 340.
Posterior vaginal enterocele (Breisky).

Prolapsus uteri and both forms of vaginal enterocele are therefore essentially the same in nature, viz., hernial. Intra-abdominal pressure usually displaces all in front of the anterior rectal wall; but may also force intestine in front of the anterior vaginal wall, or behind the posterior one.

SECTION VIII.

DISTURBANCES OF THE MENSTRUAL FUNCTION.

Chapter XLVIII. Amenorrhœa : Menorrhagia : Dysmenorrhœa.

SECTION IX.

DISTURBANCES OF THE REPRODUCTIVE FUNCTION.

Chapter XLIX. Sterility : Abortion : Retroflexion of the Gravid Uterus.

„ L. Extra-uterine Gestation.

CHAPTER XLVIII.

AMENORRHŒA: MENORRHAGIA: DYSMENORRHŒA.

The three subjects to which this section is devoted are not diseases, but are symptoms of a large number of the more or less well ascertained pathological conditions already considered. Theoretically, therefore, they should not come up for special consideration; practically, however, it is of use to the practitioner to summarize the conditions causing these symptoms, and to give some special hints as to their treatment.

AMENORRHŒA.

This means cessation of menstruation during the period between Puberty and the Menopause. It is normal to have Amenorrhœa during pregnancy and lactation. Amenorrhœa may be caused by the following *Local* conditions:—

Congenital . . .	Absence or incomplete development of uterus and annexa, atresia of the genital canal (with or without accumulation of the menstrual blood), state of Cretinism;
Acquired	Superinvolution, simple atrophy of uterus, cystic ovarian disease, extensive inflammatory conditions of uterus and ovaries.

Constitutional conditions—such as phthisis, chlorosis (v. Appendix), prematurity of menopause—also cause amenorrhœa.

The local conditions have already been fully described under the various heads; we give here only a few hints as to the investigation of the causes of this symptom. When the patient complains of *never having menstruated* and there is no constitutional cause for the amenorrhœa, the question of examination should always be entertained; abdominal palpation and rectal examination are employed to ascertain that there is no retention from atresia. To ascertain the condition of the uterus, a vaginal examination may be necessary. *Sudden cessation* of the menstruation in a girl neither phthisical nor chlorotic is usually due to pregnancy; early sickness, mammary and other signs should be looked for. Nothing is a sure sign of pregnancy except the characteristic increase in the size of the uterus, agreeing with the number of periods passed.

MENORRHAGIA.

Menorrhagia is the term applied to excessive hæmorrhage at the menstrual periods; when the hæmorrhage is intermenstrual, it is termed metrorrhagia.

The causes of menorrhagia are the following:—

Constitutional .	Hæmorrhagic diathesis, scorbutic conditions;
Local . . .	Endometritis, metritis, subinvolution, retroversion of uterus, inversion of uterus, submucous and interstitial fibroids, polypi, carcinoma uteri, sarcoma uteri, incomplete abortion.

It should not be forgotten that we may have menorrhagia in cardiac disease, and also in hepatic congestion (Matthews Duncan, Warner).

The treatment of menorrhagia is the treatment of the condition producing it. In cardiac disease we give digitalis; and in hepatic disease we may try chloride of ammonium, euonymium or iridin.

℞	Ammonii chloridi	ʒiij.
	Aquae	℥vj.
	Sig. Table-spoonful thrice daily.	
℞	Euonymii	
	vel	
	Iridin	gr. ii.
	Pil. aloes et ferri	q. s.
	Fiat pilula: mitte tales xij.	
	Sig. One at night.	

In cases where there is menorrhagia due to a simple congested condition or to a flabby state of the uterine muscle, we may give the following at the menstrual periods:—

℞	Ergotinæ	gr. iv.
	Argenti oxidi	gr. $\frac{1}{4}$.
	Mica panis	q. s.
	Fiat pilula: mitte tales xij.	
	Sig. One thrice daily as directed.	

Note that it is well not to write "at the menstrual period" on the prescription, but to put "as directed." When the practitioner is consulted as to menorrhagia in unmarried ladies or young girls, he should first try the ergotin and oxide of silver pill. If this fail and the case be urgent, he should request a local examination. If this be declined, the responsibility rests with the patient.

Ergot may be given also as follows :—

℞ Ergotæ liquidi extracti ℥ij.
Sig. Thirty drops as directed.

or

℞ Ergotinæ gr. iv.
Fiat suppositorium : mitte tales xij.
Sig. As directed.

Inform the patient that two suppositories are to be passed into the rectum each morning after the bowels move.

In some cases the hypodermic injection is required (*v.* p. 396).

DYSMENORRHŒA.

LITERATURE. *Duncan, Matthews*—Clinical Lectures, p. 131. *Goodell*—Op. cit. *Gusserow*—Menstruation and Dysmenorrhœa : Germ. Clin. Lect., New Syd. Soc. Tr., 1877. *Solowieff*—Decidua Menstrualis : Archiv. f. Gyn., Bd. II, S. 66. *Schrœder*—Op. cit. *Simpson, Sir J. Y.*—Op. cit., p. 225. *Williams, John*—Pathology and Treatment of Membranous Dysmenorrhœa : Lond. Obst. Tr., 1877.

Dysmenorrhœa may be defined as the occurrence of pain just before, during, or after the menstrual period.

The pain of dysmenorrhœa varies greatly in intensity. It may be so severe as to render the sufferer a miserable invalid, it may interfere with her work more or less, or it may cause only marked uneasiness. It is always advisable in cases of dysmenorrhœa to ascertain how much the pain interferes with the patient's occupation or whether it confines her to bed. Note also when the pain occurs—prior to, during, or after the blood-flow ; in the spasmodic form, it is during the flow.

In order to treat dysmenorrhœa intelligently, we must endeavour to ascertain its cause and try to make out how this condition brings about the pain. We know nothing at all as to the real cause of dysmenorrhœa. We know that in many instances it is associated with certain pathological conditions, but how these actually cause the pain is as yet disputed.

In normal menstruation, a fluid made up of blood and epithelial debris escapes from the uterus. Probably, it does not drain away by mere capillary action but is expelled by uterine contractions. There is no absolute proof of this, but it is a fair deduction from certain facts. Thus we have seen the pelvis filled with fluid after rupture of the uterus, and yet none had drained away through the large rent.

Dysmenorrhœa is usually divided into certain forms. It is to be regretted that this has been done, because there have not been collected pathological facts sufficient to warrant a classification. The forms usually given are the following:—

1. Dysmenorrhœa associated with certain diatheses, such as the gouty and rheumatic;
2. Spasmodic dysmenorrhœa;
3. Membranous dysmenorrhœa;
4. Dysmenorrhœa associated with inflammatory conditions of the ovary, peritoneum or cellular tissue;
5. Ovarian dysmenorrhœa.

The last term is applied to certain cases which were supposed to be specially connected with the ovaries and which could not be classified under the preceding heads. The term is a most unfortunate one. It assumes a cause for dysmenorrhœa which is not, as yet, demonstrated; and, instead of pathological facts or a confession of our ignorance of them, gives us what we have too much of already—erroneous terminology.

So far as our present knowledge goes we can speak of three varieties:—

1. Spasmodic dysmenorrhœa;
2. Membranous dysmenorrhœa;
3. Dysmenorrhœa associated with maldevelopment of the sexual organs, pyosalpinx, fibroma uteri, rheumatic diathesis, and some other unknown causes.

1. *Spasmodic dysmenorrhœa.* Of this the most frequent cause is pathological anteflexion, *i.e.*, anteflexion of the uterus produced by inflammation in the utero-sacral ligaments with cicatrisation. The pathology, diagnosis and treatment of this affection is given at pp. 315-328. We only remark here that it is a very serious lesion owing to its inflammatory etiology. From the flexion produced we get spasmodic uterine contraction, accompanied with very great pain and expulsion of clots. Two theories of dysmenorrhœa have been already explained (p. 319). Those who hold the purely mechanical theory seem to forget that fluid blood passes easily through a capillary. Does any one believe that the lumen at the flexion is less than that of a capillary?

Spasmodic contraction of the os internum and constriction of the cervical canal are also advanced as causes.

2. *Membranous dysmenorrhœa.* In this condition, the superficial layer of the mucous membrane is cast off as a coherent triangular sac or in shreds of a more or less firm consistence (figs. 341, 342). This may

result from the occurrence of hæmorrhage in the deeper layers of the mucous membrane; and then we can understand that, according to the depth, we have present no part of the glands or only their cœcal extremities (Solowieff and Gusserow). Microscopically, there is excess of round cells and fibrillated tissue in the membrane.

Williams of London, who has written ably on this subject, believes that, owing to an excess of fibrous tissue in the walls of uterus, the mucous membrane is expelled in coherent shreds. This excess of fibrous tissue is due to defective evolution, sub-involution, or metritis. The membrane is, further, never a plastic exudation. *It is of the greatest importance to remember that it is not a product of conception and should not be mistaken for an early abortion.*

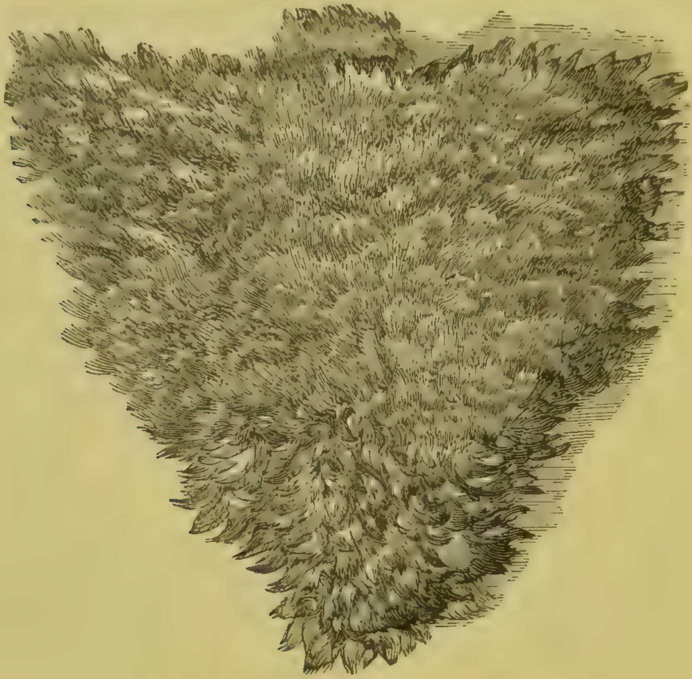


Fig. 341.

Sketch of a dysmenorrhœal membrane as seen under water (Sir J. Y. Simpson).

3. *Dysmenorrhœa from other causes, as defective development of uterus, &c.* Many of these conditions are now being elucidated by abdominal section undertaken for Battey's operation.

TREATMENT.

At the outset we are met with a difficulty. As we are usually consulted for Dysmenorrhœa in unmarried women, the question of the propriety of a pelvic examination comes up. As Duncan has said—" No rules that I can give you will make up for want of good sense and good feeling on your own part, but I shall give you some hints. The first is that you should, as a rule, not resort to this treatment (by bougies) in an unmarried young woman without the concurrence of three parties—firstly, your own approval; secondly, that of the mother or guardian of the patient; and, thirdly, that of the patient herself. All of these should be quite aware of the circumstances, and of what it is proposed to do."

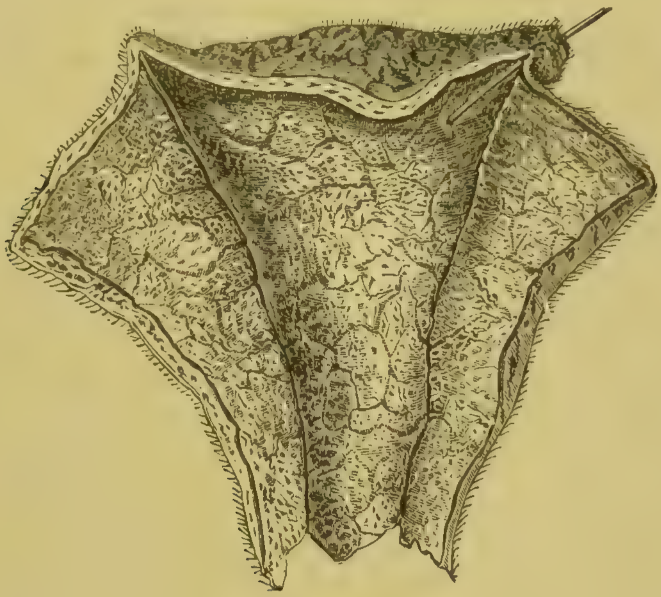


Fig. 342.
A dysmenorrhœal membrane laid open (Coste).

Nothing can be more reprehensible than the vaginal examination of unmarried women for trifling ailments. When the Dysmenorrhœa is slight, make no examination but order some such mixture as the following.

℞ Spiritus chloroformi.
Spiritus ammoniæ aromaticæ, āā ℥ss.
Liquoris ammoniæ acetatis ℥iss.
Sig. Teaspoonful in a wine-glass-full of hot water, occasionally.

Order a hot hip bath, or the feet to be put in mustard and water. On no account whatsoever allow alcohol in any form to be given. If the mother has been giving whisky and water or gin and water, at once point out the risk the patient is running. Do not give morphia, or other opiate, unless driven to it; always give it yourself and hypodermically, never by the mouth or rectum, and give no prescription for it.

When the Dysmenorrhœa is urgent, then an examination should be advised; the index finger well oiled can usually pass in without much pain.

If pathological anteflexion is found, note the amount of inflammatory disturbance, the degree of flexion, and the implication or non-implication of the ovaries. Begin by ordering blisters to the iliac regions, bromide of potash, the glycerine plug, and the hot vaginal douche. See that the bowels are regulated, and soft motions secured by the use of liquorice powder (Pulv. glcyrrhizæ co.) and occasional enemata. Note the effect of this for some periods; and then, if unrelieved, pass sound or graduated bougies or use uterine dilator. This course benefits the Dysmenorrhœa, and it is safer than the use of stem pessaries; the dilatation by bougies seems to act like the stretching of the sphincter ani in fissure of the anus. In certain cases, Sim's operation is required (*v.* p. 326).

If the Dysmenorrhœa is membranous, treatment is of little service. The following prescriptions may be tried.

℞ Liquoris arsenicalis ʒij.
Sig. Three drops in water thrice daily.

℞ Liquoris arsenici et hydrargyri hydriodatis ʒij.
Sig. Five drops in water thrice daily.

The action may be analogous to that of arsenic in Psoriasis.

Treat any endocervicitis or stenosis of cervix present. The prognosis is unfavourable as to cure. The patients are not necessarily sterile.

In the third class of cases, Battey's operation has not given the results anticipated. We have not as yet, however, facts warranting any dogmatic utterances. Where the ovaries are developed but not the uterus, with serious menstrual molimina resulting in consequence, Battey's operation is undoubtedly indicated. We hope that abdominal section, as now practised by many gynecologists, will lessen the number of otherwise incurable cases.

Where any diathesis (rheumatic or gouty) is supposed to influence the Dysmenorrhœa, guaiac, colchicum and such specific drugs may be given.

CHAPTER XLIX.

STERILITY: ABORTION: RETROFLEXION OF THE GRAVID UTERUS.

LITERATURE.

STERILITY. *Duncan, Matthews*—Fecundity, Fertility, Sterility and allied topics: Edinburgh, A. & C. Black, 1866. v. *Grünewaldt*—Ueber die Sterilität geschlschtskranker Frauen: Archiv. f. Gyn., Bd. 8 Hft. 3, 1873. *Kehrer*—Archiv. f. Gyn.; Bd. 10, Hft. 3. *Mayrhofer*—Sterilität des Weibes etc., Billroth's Handbuch, Stuttgart 1882. *Sims, Marion*—Uterine Surgery. *Simpson, Sir J. Y.*—Obstetrics, p. 830.

ABORTION. *Hegar*—Monats. f. Geburtskunde, Bd. 21, Suppl. S. 1. *Simpson, A. R.*—On the complete evacuation of the Uterus after Abortion: op. cit., p. 104. *Whitehead*—On the causes and treatment of abortion and sterility: London, 1847.

STERILITY.

BY sterility is understood that conception has not taken place, not that it is impossible. So little is known on the physiology of normal conception that our considerations with regard to sterility must be mostly theoretical. We do not know at what time a Graafian follicle ruptures, which ovum is fertilised, how long the ovum takes to pass down the Fallopian tube, at what point it is impregnated, what the circumstances are which diminish its vitality and lessen the probability of its impregnation. The rarity of conception, although an ovum capable of fertilisation is discharged at each monthly period during the whole time of sexual activity, shows that a great variety of conditions must be essential. According to Farr, the average number of children to each marriage in Great Britain is 4·2 p.c., which contrasts strikingly with the number of ova matured during married life.

With regard to sterility we should advance the following considerations. *First*, the spermatic fluid must contain spermatozoa, and these must possess vitality high enough to impregnate the ovum; according to Kehrer, one-fourth of the cases of sterility is due to the nonfulfilment of this condition. *Second*, acid solutions at once destroy, while alkaline solutions preserve, the vitality of spermatozoa; the secretion of the vagina is therefore destructive. *Third*, as the spermatozoa are microscopic structures, mere stenosis of the genital canal cannot mechanically prevent their passage. *Fourth*, pelvic inflammation binding down the ovaries or displacing the Fallopian tubes will produce sterility. *Fifth*, under the causes of sterility we must include not only those which prevent impregnation of the ovum but those which hinder its attachment to the uterus. The fertilised ovum is implanted, as it were, in the uterine mucous membrane by the root-like chorionic villi ; pathological changes in either of these structures prevent the ovum from becoming firmly rooted or from receiving the requisite nutriment.

Sterility is found associated with the following conditions already described :—vaginismus, p. 494 ; hypertrophied cervix, p. 251 ; conical cervix with pin-hole os, p. 238 ; cervical catarrh, p. 278 ; anteflexion, p. 319 ; retroflexion (more rarely), p. 338 ; endometritis, p. 290 ; ovaritis, p. 182 ; pelvic peritonitis, p. 152. The last three are probably the most important. The treatment of these has been already described. Cases of vaginismus and contracted os externum are the most hopeful as regards the cure of the sterility ; with retroflexion the replacement of the uterus is sometimes followed by conception, but in these cases the patient is rarely a nullipara.

ABORTION.

Abortion is so important a factor in the causation of uterine disease that its proper management calls for notice in a work on Gynecology. Many cases of endometritis and metritis may be traced back to a mismanaged abortion.

The cause of abortion may be (1) in the fœtus or (2) in the mother. On the part of *the fœtus*, disease of the chorion and hæmorrhage into the fœtal part of the placenta produce death of the fœtus and consequent abortion ; these conditions are most frequently due to syphilis. On the part of *the mother*, endometritis and metritis are the most important causes. General debility and fevers (typhus and scarlet) also produce abortion. Patients show a marvellous ingenuity in tracing back miscarriage to a mechanical cause, such as a violent muscular effort ; the cause is rarely of this nature, although it is evident that a severe blow or fall might lead to hæmorrhage and separation of the membranes. When the fœtus dies at the second or third month and is not immediately expelled, it is a 'missed abortion' ; in such a case the fœtus does not putrify but shrivels up and becomes mummified. In a case reported by Matthews Duncan, the fœtus died at the second month but remained in the uterus for other five months during three of which the amenorrhœa continued.

P. 545, line 3;

For *tar minior doses*, read *ten minim doses.*

The treatment of *threatened abortion* is to keep the patient recumbent, perfectly quiet, and under opium if necessary; where there is hæmorrhage, ergot (liquid extract) in *tar minior doses* every few hours will check it without expelling the ovum.

In the management of abortion in a patient who is the subject of chronic inflammation of the uterus, two points require special attention. *The patient should lose as little blood as possible:* hence, when abortion is imminent, the case should not be allowed to drag on for days in the hope that the abortion may be staved off—the doubtful life of the fœtus is of little value compared with the health of the mother; and besides there will, probably, soon be a second conception and the proper management of this abortion will have brought the uterine mucous membrane into a condition more favourable for pregnancy. *The uterus should be completely evacuated,* and as long a period of rest allowed for involution as after a full-time labour.

To secure these ends we proceed as follows. The vagina having been washed-out with carbolised water, a large-sized sponge-tent is passed fairly into the cervix; this is facilitated by drawing down the cervix with the volsella. After 8 or 10 hours, the os should be sufficiently dilated to admit one or two fingers.

The patient is put under chloroform as this greatly facilitates the bimanual manipulation. A douche of hot carbolised solution (2 p.c.) is prepared, a nozzle the size of a catheter being fixed on to the tube—the sponge-tent, if not already expelled, is withdrawn, and two or three fingers (if possible, the whole hand) are passed into the vagina. One or sometimes two fingers are introduced through the cervical canal into the body of the uterus, and made to sweep round and round the wall so as to detach the decidua on all sides. If there is room at first for only one finger, a second may be slowly introduced so as gradually to stretch the canal; the uterus is at the same time grasped through the abdominal wall with the left hand, and pushed down upon the fingers of the right hand until they reach the fundus. No portion of the ovum is removed until the whole is felt to be perfectly free within the uterine cavity. To remove the ovum, hook (not pull) it down with the fingers. The two fingers are the best pair of abortion forceps, although various forms of instrument have been devised.

The uterus having been thus completely emptied, the nozzle of the douche is carried up to the fundus and the cavity gently washed out with the hot carbolic solution; this prevents hæmorrhage and septicœmia. Twelve minims of the ergotin solution (3 grs.) are given hypodermically. The patient keeps at rest for a fortnight or three weeks.

RETROFLEXION OF THE GRAVID UTERUS.

This condition belongs properly to obstetrics ; it is important, however, to the gynecologist in regard to differential diagnosis, and has been so frequently mentioned in this connection that it requires brief notice here.

When conception occurs in a retroflexed uterus, it may right itself (v. p. 339) ; how often it does so we do not know, as we only see those cases in which reposition has not taken place. Compared with the frequency of this displacement in the non-pregnant uterus, Retroflexion of the Gravid Uterus rarely comes under our notice. Among the patients admitted to the Buchanan Ward during the last two years, we have seen only four cases.

At the fourth month, the retroflexed gravid uterus is of such a size that it fills the pelvis and presses on the bladder and rectum ; the relation of the pelvic organs will be evident from fig. 343.

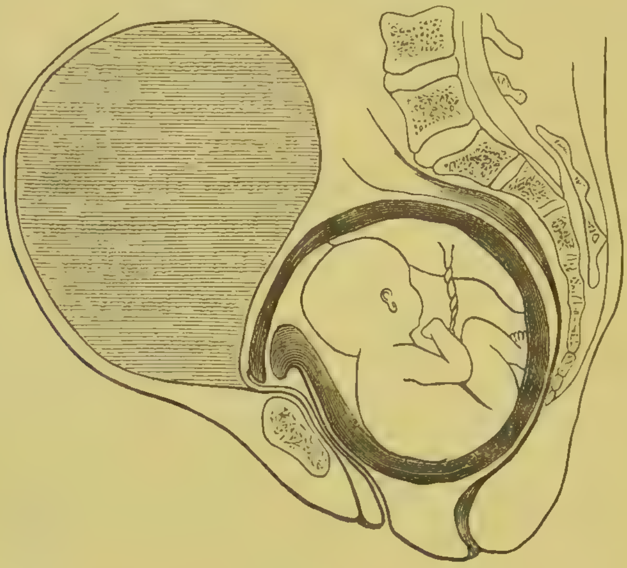


Fig. 343.

Retroflexion of the Gravid Uterus producing, through compression of the urethra, distension of the bladder ; it also presses on the rectum (Schrœder).

The diagnostic symptoms are *retention of urine and four months amenorrhœa ;* sometimes there is constant dribbling of urine from over-distension, which may mislead the practitioner. Complete retention is often first noticed on the patient's having retained water for a longer period than usual. Catarrh of the bladder, and even exfoliation of its mucous membrane, arises secondarily. Further, there is difficulty in defæcation, and, when the pressure is great, pain in the pelvis. The usual symptoms of pregnancy are also present.

The *physical examination* shows a fluctuating tumour in the abdomen reaching to the umbilicus and usually to the right of the middle line —this disappears on using the catheter ; the vagina is elongated and compressed against the pubis; the cervix may be more accessible than usual, more frequently it is high up and may be above the pelvic brim ; the posterior fornix is depressed by an elastic tumour which fills the pelvis, and is found on combined recto-abdominal examination to be the retroflexed uterus. The bladder is lifted upwards into the abdomen (*v.* p. 34).

Reposition may occur spontaneously after the urine has been drawn off and the bowels have been thoroughly emptied by a purge and enema ; the patient is instructed to pass water every hour. After a day or two if reposition has not occurred, or at once if the uterus is found to be firmly wedged and the symptoms are distressing, we replace it in the following way. The patient is placed in the genu-pectoral posture, and steady pressure is made on the bulging tumour in the posterior fornix by two fingers per rectum ; the cervix is at the same time drawn downwards with the volsella (v. fig. 212).

An interesting process of gradual spontaneous reposition occurred in one of the four cases referred to. The portion of the uterus above the brim, as it increased in size, drew the portion wedged in the pelvis upwards into the abdomen.

Sometimes the pregnant uterus expands into the abdomen while a portion remains wedged below the promontory. Such a condition seriously complicates the labour, as in the case reported by W. L. Reid.*

---

* On a labour obstructed from an unusual cause : Trans. Edin. Obst. Soc., Vol. V., Part III., p. 36. This condition is also referred to by Pallen—A case of abdominal pregnancy treated by Laparotomy : Amer. Jour. of Obst., July 1880.

CHAPTER L.

EXTRA-UTERINE GESTATION.

LITERATURE.

Bandl—Die Krankheiten der Tuben, etc.: Stuttgart, 1879, S. 41. *Barnes*—Op. cit., p. 339; and Lond. Obst. Trans., XIV. p. 325. *Hecker*—Beitr. zur Lehre von der Schwangerschaft ausserhalb der Gebärmutterhöhle: Monats. f. Geburtskunde, Berlin 1859, Bd. XIII. *Hennig*—Die Krankheiten der Eileiter u. die Tubenschwangerschaft: Stuttgart, 1876. *Parry*—Extra-uterine Pregnancy: Lewis, London, 1876. *Reeve*—A case of Extra-uterine Pregnancy, with successful application of electricity: Amer. Gyn. Trans., 1879, p. 313. See discussion on this paper. *Schrœder*—Lehrbuch der Geburtshülfe: Bonn, 1880, S. 401. *Spiegelberg*—Lehrbuch der Geburtshülfe: Lahr, 1878, S. 308. *Thomas*—Op. cit., p. 765. The student will find the pathology most fully in Bandl, the diagnosis and statistics of the various modes of treatment in Parry.

THIS comparatively rare condition concerns the gynecologist as much as the obstetrician; the cases come under notice at an early period of pregnancy and, in symptoms and diagnosis, have much in common with purely gynecological cases; the treatment belongs more to operative gynecology than to obstetrics.

PATHOLOGY.

The following is the course of the fertilised ovum in its passage to the uterus: Graafian follicle, fimbriated end of Fallopian tube, canal of Fallopian tube, interstitial (within uterine wall) portion of Fallopian tube, horn of uterus. It may be arrested at any point in this course and, becoming attached, pass through the stages of fœtal development just as it does in the uterine cavity.

Of *extra*-uterine gestation, there are therefore the following varieties: ovarian and abdominal, tubo-ovarian, tubal, interstitial, and that which occurs in an isolated horn.

As to the frequency of extra-uterine gestation, Bandl mentions that out of 60,000 gynecological and obstetrical cases (received during seven years at the cliniques of Carl Braun and Späth in Vienna) there were only 5 cases.

As to the relative frequency of the various forms, tubal gestation is the most common—about two-thirds of all the recorded cases.

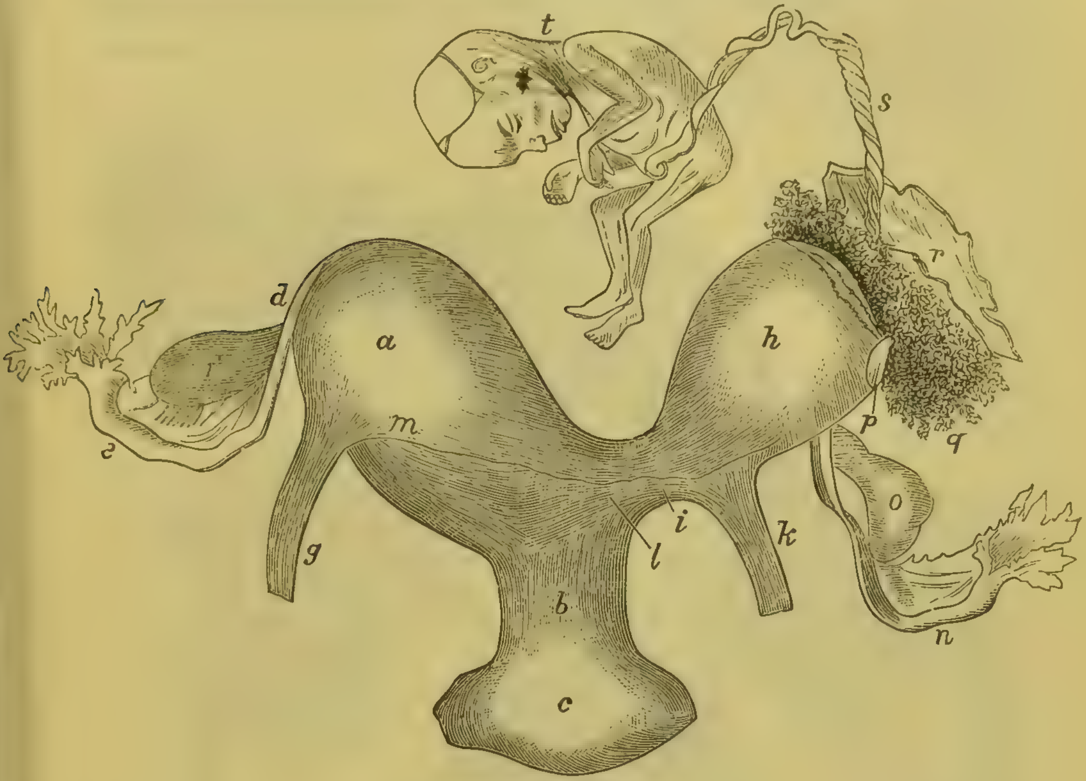


Fig. 344.

Gestation in the detached left-horn: *a* right-horn of uterus; *b* neck; *c* vagina; *d* point of right-horn; *e* right Fallopian tube; *f* right ovary; *g* right round-ligament; *h* detached left-horn; *i* its connection with uterus; *k* left round-ligament; *l* muscular fibre springing from the left round-ligament and passing to the right-horn; *m* margin of peritoneum dissected off; *n* left Fallopian tube; *o* left ovary with corpus luteum; *p* seat of rupture with everted margins; *q* placenta; *r* membranes; *s* cord; *t* fœtus (Kussmaul, reported by Heyfelder).

Whether there is an ovarian gestation, by which we understand that the ovum is fertilised in the Graafian follicle and continues to grow there, is a disputed point; Schrœder holds that many cases described as abdominal were really ovarian, that is that the ovum was fertilised while in the ruptured Graafian follicle and developed within it.

After the gestation has gone on for some months, the structures in the broad ligament become displaced by the tumour and obscured by adhesions, so that it is impossible to say where the ovum began to grow. Cases of abdominal gestation probably begin as tubal or tubo-ovarian.

Gestation in the isolated horn of a uterus bicornis has been already referred to (*v.* p. 232) and a case of it has been described (*v.* fig. 145); fig. 344, taken from Kussmaul, represents a case reported by Heyfelder.

In interstitial gestation, the fertilized ovum has been arrested in the tube at its uterine end where it passes through the substance of the wall of the uterus; in these cases it was supposed that the ovum was growing interstitially, in the substance of the wall. This form of gestation is seen at fig. 345.

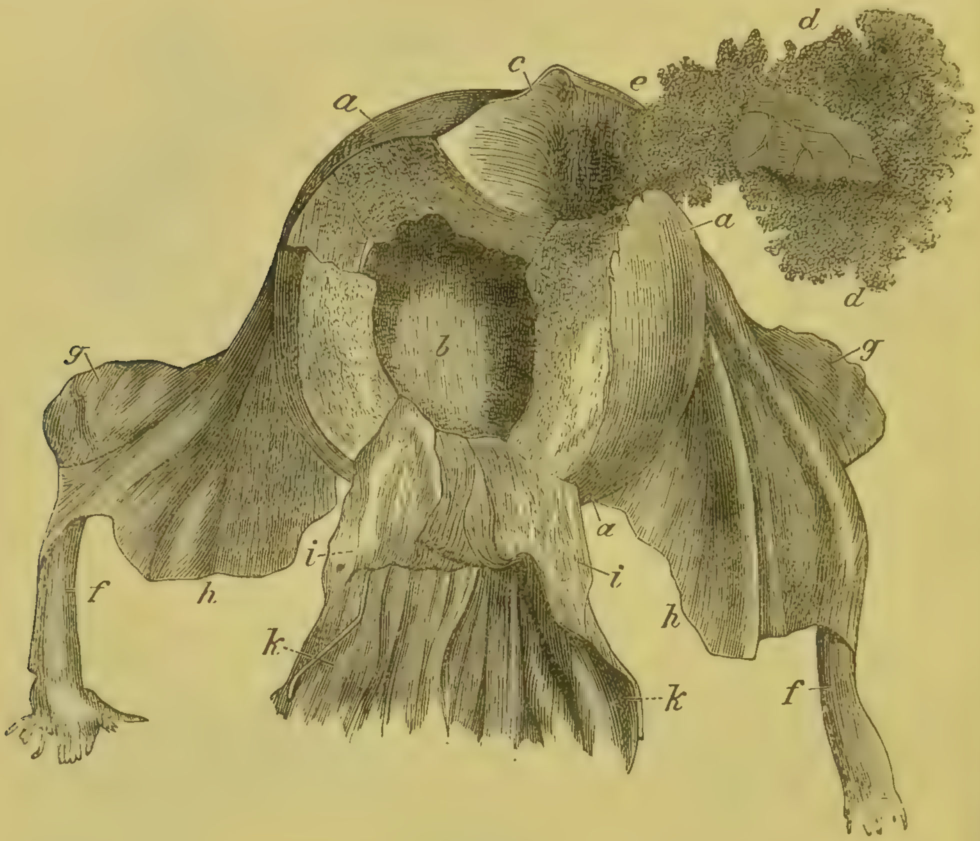


Fig. 345.

Interstitial gestation: *a* body of uterus; *b* cavity laid open from the front; *c* embryo sac in wall of uterus; *d* ovum with branching villi; *e* place where the placenta is forming and is still adherent to the wall of the uterus; *f* Fallopian tubes; *g* ovaries; *h* broad ligaments; *i* cervix; *k* vagina.

The two structures which call for special notice are (1) the wall of the gestation sac and (2) the placenta.

The *wall* of the sac consists, in a tubal gestation, of the dilated Fallopian tube; this does not develope with the developing fœtus (as the uterine wall does) and hence, when the latter has grown till about the 2d or 3d month, it ruptures from the strain. When the ovum is growing at the fimbriated end or in the abdominal cavity, the wall is formed by adhesions; these yield, and when they rupture new adhesions form outside; hence the sac is capable of increasing in size. Tubo-ovarian and abdominal pregnancies go on for a longer period than tubal—even to full time.

The *placenta.* The mucous membrane of the tube hypertrophies and forms a highly vascular areolar tissue; a structure analogous to the decidua serotina is thus formed, in which the chorionic villi are embedded (Rokitansky).

The uterus itself undergoes the changes of pregnancy. It becomes softer and larger, a decidua forms in its cavity (fig. 346); these changes are most marked in interstitial, less constant in tubal, and still less so in tubo-ovarian. Fig. 347 shows the size of the uterus in a case of tubo-abdominal gestation of seven months' duration, described by Bandl. The vagina, cervix and mammæ undergo the changes of pregnancy and thus aid in the recognition of the condition.

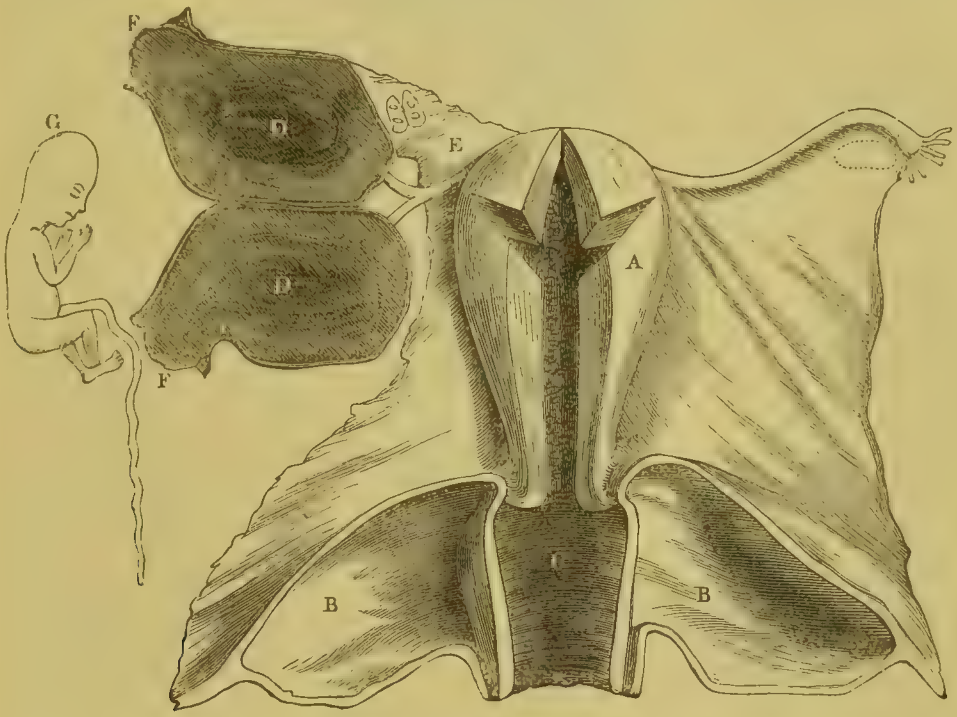


Fig. 346.

Fallopian-tube gestation which has burst: *A*, uterus with decidua; *B*, bladder; *C*. vagina; *D*, gestation sac which has ruptured at *F*; *E*, posterior layer of broad ligament turned up so as to show ovary with corpora lutea; *G*, Fœtus (W. Wilson).

ETIOLOGY.

The cause must evidently be some mechanical obstruction to the passage of the ovum through the Fallopian tube. Pelvic peritonitis, producing adhesions, will constrict the lumen of the tube (Hecker). Bandl explains the relatively greater frequency of extra-uterine gestation in older patients by the fact that catarrh of the tubes (which produces adhesions with obliteration of the lumen) is more frequent in them.

Polypi at the entrance to the tube or in the tube itself have been found as the cause of obstruction.

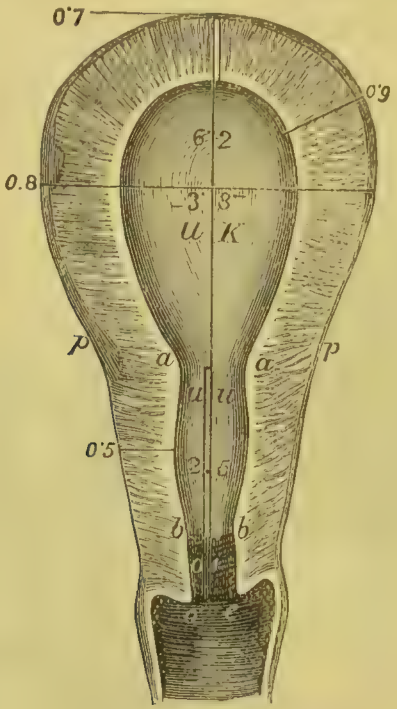


Fig. 347.

Section of a uterus in a tubo-abdominal pregnancy of seven months duration. UK body of uterus, *pp* fixed point of reflection of peritoneum, *aa* os internum of Braune, *bb* os internum of Müller, *oe* os externum. The decidua extended as far as *bb*, from which Bandl concludes that the part of the cervix *uu* is taken up into the body of the uterus during pregnancy. The numbers indicate the thickness (in cm.) of the walls and the size of the cavity (Bandl).

SYMPTOMS AND DIAGNOSIS.

These, briefly described in the order of their development, are the following.

1. *Those of pregnancy.* Amenorrhœa, morning sickness, enlargement of the breasts; the patient says that she supposes herself pregnant. As to the amenorrhœa, we must note that it is not continuous; two periods are passed; and then the menstruation may return, or there may be more frequent hæmorrhages as in the case to be described; with hæmorrhage, portions of decidual membrane may be expelled.

2. *Sudden onset of pain, collapse and internal hæmorrhage.* This means that the gestation sac has ruptured. From the greater frequency of the tubal gestation and the fact that it bursts at an early period—second or third month—with a fatal result, the practitioner often sees the case just at this stage and with these symptoms. He must remember, however, that a hæmatocele due to any other cause will produce the same symptoms and physical signs; the history of supposed pregnancy

is presumptive of this condition, but absolute certainty is only gained on post-mortem examination.

3. If the case does not thus terminate, there are *occasional attacks of pain in the pelvis and symptoms of inflammation.* This means that the sac has not ruptured, or has done so only partially; the old limiting adhesions are being stretched or torn, and new ones are forming.

4. After the fourth month, *pressure symptoms* often develope; there is difficulty in micturition (amounting to retention), and in the action of the bowels. This is due to the sac's having fallen down behind the uterus into the pouch of Douglas and being of such a size as to fill the pelvis; with this, the uterus will also be displaced. The condition is in many points analogous to retroflexion of the gravid uterus. Pressure symptoms are not always present; the sac may be fixed by adhesions which prevent its falling into the pouch of Douglas.

5. Finally, the *physical signs of advanced pregnancy* appear; the fœtal heart is heard; the parts of the child are felt on palpation. This may be prevented by two causes. (1.) The gestation sac may at any period cease to enlarge; suppuration may lead to discharge of the fœtus, or lime salts may be deposited in it producing a lithopædion. (2.) The fœtus may die but the sac with the placenta continue to grow and enlarge. It is evident that the diagnosis of this during life is impossible, as the death and shrivelling up of the fœtus remove the features which distinguish this from other tumours beside the uterus.

Differential diagnosis. When the sac ruptures early, differential diagnosis of hæmatocele due to this cause (from that due to any other cause) is impossible without a post-mortem examination. The abdominal pain and vomiting which sometimes accompany rupture of the sac have led to suspicion of *irritant poisoning*, as occurred in the case * seen at fig. 346.

When the sac has not ruptured, it must by careful palpation be differentiated from the following conditions;—

1. Normal gravid uterus,
2. Retroflexed gravid uterus,
3. Simple hæmatocele,
4. Ovarian tumour,
5. Fibroid or fibro-cystic tumour,
6. Extensive pelvic inflammation.

1 and 2. The fact that *the uterus may be felt separate from the tumour* differentiates this from the first two conditions. It is evident

---

* See Trans. Edin. Obst. Soc. Vol. V., Part III., p. 169, for the history of this case; for the figure we are indebted to Dr Wilson.

however, that when the gestation is close to the uterus, this separation will not be made out. Also when the uterus is stretched upon the wall of the sac (*v.* Plate IX.), a condition is produced which simulates retroflexion of the gravid uterus. Contractions are not felt in the sac as in the pregnant uterus. Normal intra-uterine has co-existed with extra-uterine gestation.

3. Gradual increase in size and the symptoms of pregnancy distinguish the unruptured sac from hæmatocele ; the latter becomes firmer and is then absorbed.

4. The close resemblance between a small ovarian tumour and a tubal gestation demands, where pregnancy is suspected, careful watching of the development of the tumour and examination for ballottement or the souffle and fœtal heart ; in some cases puncturing and drawing off a little fluid aid diagnosis, but this must be done with caution (*v.* Treatment).

5. Fibroid tumours are of a firm unyielding consistence and do not grow so rapidly as a gestation sac would. They are of a large size before they become cystic.

6. Pelvic inflammatory deposit has not the same defined outline. We must remember that an abdominal gestation owes the formation of its sac to inflammatory changes.

PROGRESS AND TERMINATION.

More than four-fifths of the cases end fatally ; the mortality is 82·5 p.c. (Kiwisch). In 150 cases of tubal gestation, Hennig found that a fatal result followed in 88 p.c. This occurs most frequently at the second, third or fourth month (Bandl).

A favourable result may be due to operative interference, or to the death of the fœtus and its expulsion piecemeal; more rarely does it shrivel up and, becoming calcified, form a lithopædion.

TREATMENT.

Four methods have been adopted : (1) Tapping the sac and drawing off the liquor amnii ; (2) Tapping and injecting morphia or other narcotics ; (3) Electricity ; (4) Removal of the fœtus by abdominal section or through the roof of the vagina. The first three simply aim at destroying the life of the fœtus, leaving it to become mummified or to be discharged by inflammation and suppuration. Tapping should not be employed unless the nature of the tumour be doubtful, in which case it is necessary for diagnosis ; the sudden evacuation of the sac has been followed by contractions, complete rupture and death. Where the diagnosis is certain and the sac situated low down in the pelvis, it may be opened into through the vaginal roof with the thermo-cautery. The fœtus is removed but not the placenta. The advantage of cutting to the sac through the vagina is that it allows us, in the case of hæmorrhage, to plug the sac with salicyllic silk. The risk here will be that in opening the sac we cut into the placenta. The seat of the placenta might perhaps be ascertained by a preliminary puncture (Fränkel). When the sac is inaccessible from the vagina, laparotomy should be performed; here it is best, if possible, to remove the sac entire as one would an ovarian tumour. If this cannot be done, the fœtus might be removed and the sac stitched to the abdominal walls. In the case of tubal pregnancy, we should operate as soon as the case is diagnosed; in the case of abdominal, we can wait till the full time of pregnancy has been reached (see last paragraph on p. 550). We recommend to the student the chapter on extra-uterine pregnancy in Thomas' work as giving the best resumé of treatment that we know of.

When the fœtus is dead, are we to operate? The preparation (Plate IX.) shows that the placenta may continue to grow and lead to fatal internal hæmorrhage; it also shows that after a time removal may be impossible.

CASE OF EXTRA-UTERINE GESTATION, WITH DEATH OF THE FŒTUS BUT CONTINUED GROWTH OF THE PLACENTA, WHICH LED TO FATAL HÆMORRHAGE.

'*History.* A.B. æt. 24, IV-para. Five months ago, passed two periods without menstruating, had morning sickness, thought herself pregnant. Three months ago, began to have irregular hæmorrhages thrice a month and in considerable quantity; at same time began to have pain in the back and across the abdomen sometimes so severe that she had to sit down, but was never confined to bed. For the last six weeks, has had difficulty in moving the bowels; three weeks ago and on other occasions since, has had retention of urine requiring catheterisation.

Clinical features. After drawing off ℥100 of urine with the catheter, a tumour is found impacted in the pelvis. The vagina is compressed against the pubis, the cervix is beyond reach above the brim, the bladder is displaced into the abdomen. The tumour is of the size of a 4½-months pregnant uterus but of a firmer consistence, no uterine contractions are felt in it; auscultation reveals neither uterine souffle nor fœtal heart; no uterus can be felt separate from the tumour. Professor Simpson punctured the cyst with an aspirator-needle through the posterior fornix; only blood was obtained.

The patient died with symptoms of internal hæmorrhage with increase in size of the pelvic tumour.'

Post-mortem examination. The uterus is seen to form part of the anterior wall of a tumour which completely fills the pelvis (fig. 348); on each side is the peritoneum of the anterior surface of the broad ligaments; the round ligaments can be traced as in fig. 348, the right one passing more directly outwards than the left. The intestines were adherent to its upper surface at the point *h*; on detaching them, a recent hæmatocele was opened into.

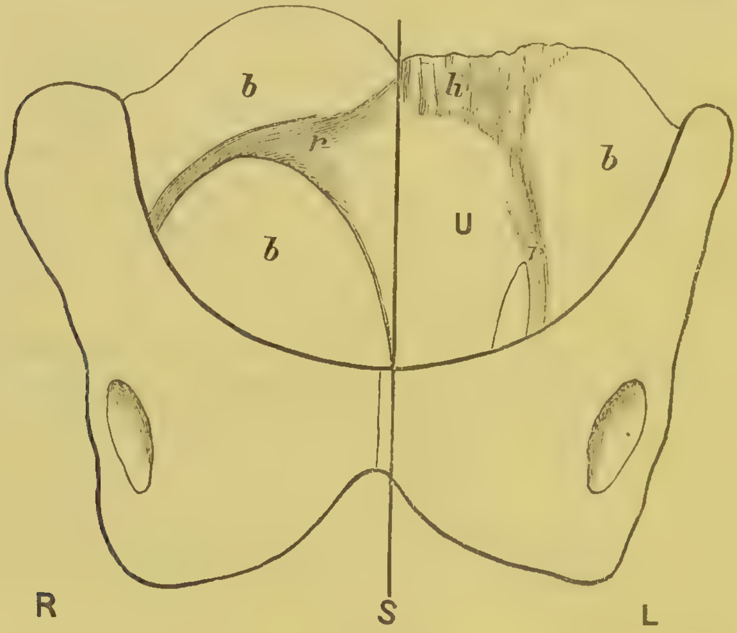
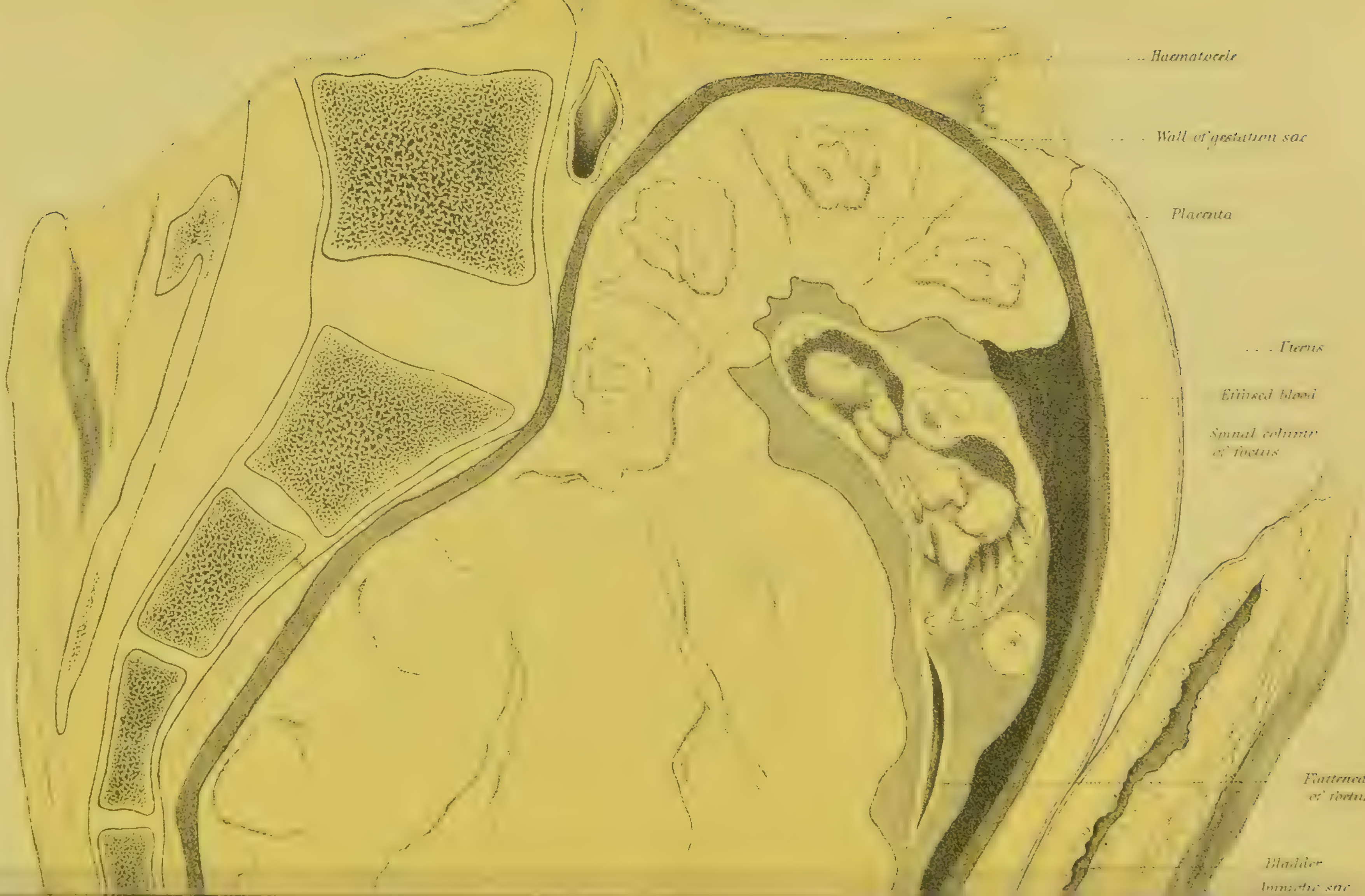


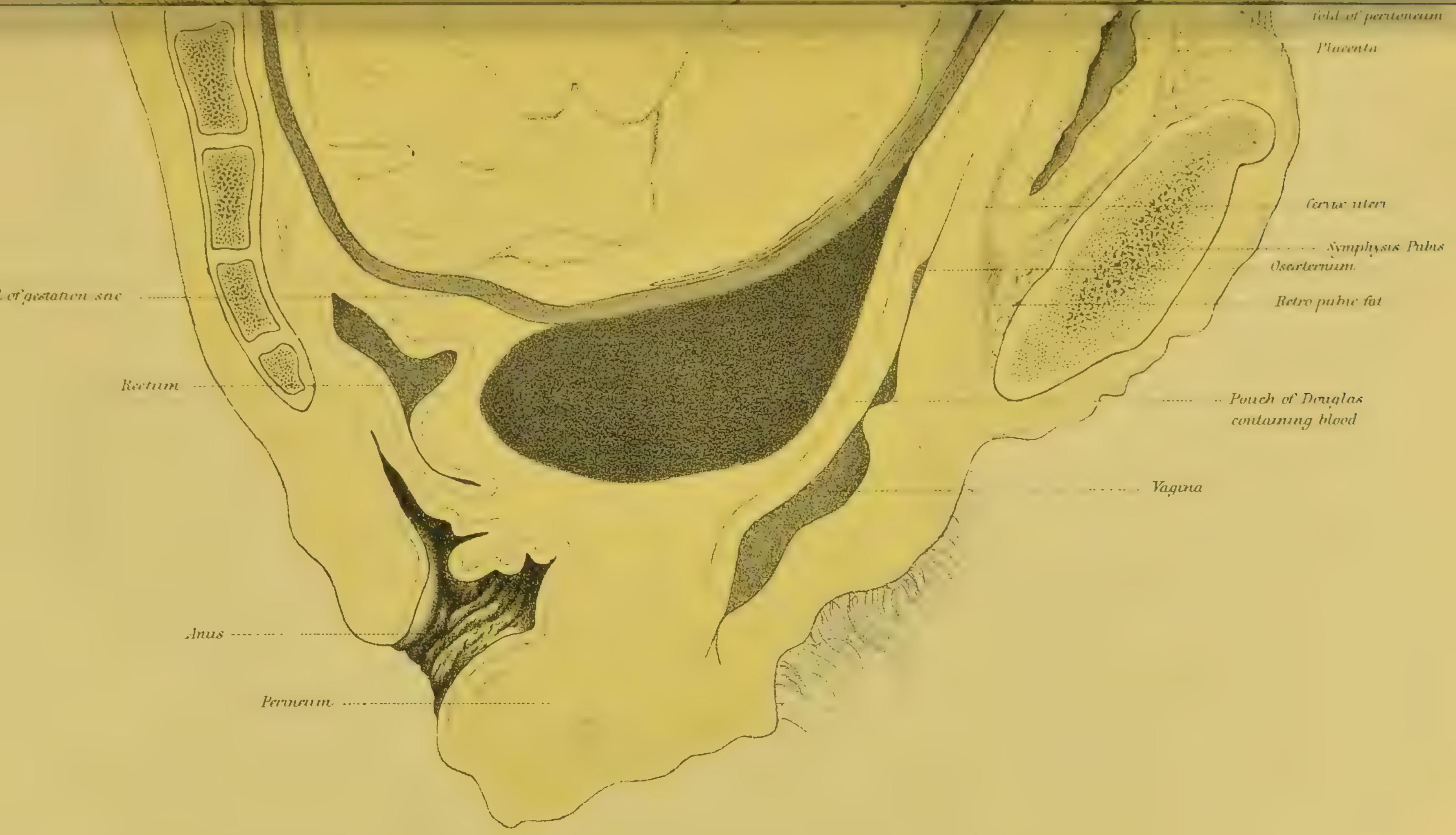
Fig. 348.

Front view of pelvis and tumour, seen in section at Plate IX. *U* uterus, *bbb* broad ligaments, *rr* round ligaments, *h* adhesions from uterus to omentum which enclosed haematocele (Barbour).

The pelvis was frozen and a section made, with a saw, through the line S. An accurate tracing of the frozen section was taken on glass, of which Plate IX. is a faithful representation.

Description of Plate IX. The empty bladder extends to 3 inches above the symphysis pubis. The utero-vesical pouch of peritoneum is almost on a level with the pelvic brim. The uterus is divided through its left wall—the cavity not being cut into; it measures 5¾ inches (14·6 cm.) long, the fundus being 5 in. (12·7 cm.) above the symphysis: the cervix is drawn up so that the fornices are obliterated. From the upper border of fundus adhesions passed to the omentum, which enclosed a hæmatocele (fig. 348 *h*). The gestation sac lies apparently in the pouch of Douglas, the lower part of which contains recently effused blood. The sac is chiefly occupied by the placenta, into which numerous


Haematocele
Wall of gestation sac
Placenta
Uterus
Effused blood
Spinal column of foetus
Flattened hea of foetus
Bladder
Amniotic sac



EXTRA-UTERINE GESTATION.

hæmorrhages have occurred. The cavity of the amnion can be traced down to the lowest part of the sac, but contains little fluid; it is separated from the anterior wall of the sac by blood effusion. The fœtus has been divided about the level of the diaphragm, so that the thoracic viscera and ribs are visible; an arm is seen in section below the trunk; the head has collapsed and fallen down to one side of the thorax, so that the flat bones are seen (like a compressed shell) in section. The fœtus is about the size of a three-months pregnancy.

This case presents the following points worthy of note. The patient was young and had had a series of normal pregnancies immediately before this one: after two months' amenorrhœa, irregular hæmorrhages occurred from the uterus; there was no history of rupture of the sac; fœtal

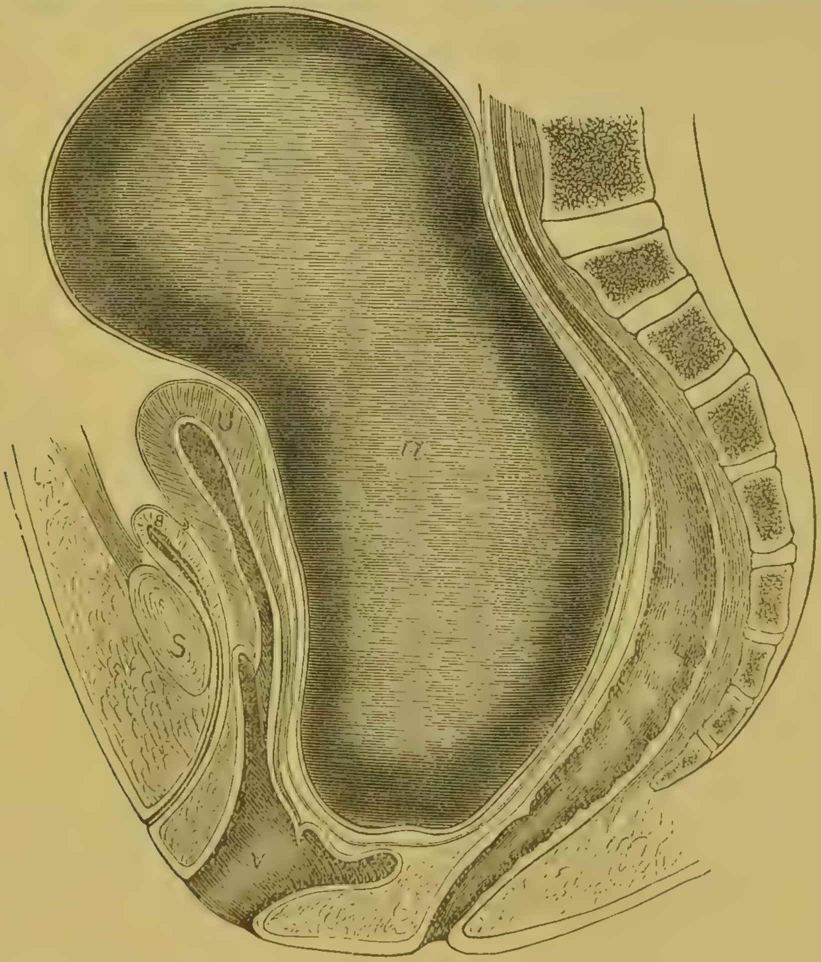


Fig. 349.

Diagrammatic representation of an extra-uterine Pregnancy of seven months duration (Bandl). *B* Bladder; *U* uterus (anterior wall measured 12 cm. long; posterior 16 cm.; thickness at side-walls was 2 cm.): anterior lip is at level of middle of symphysis S, posterior lip is at level of urethral orifice; gestation sac, which reached to the umbilicus.

movements had never been felt and the auscultation gave negative results; pressure symptoms appeared at the fourth month as in retroflexion of the gravid uterus; the uterus was taken up, as it were, into the wall of the sac so that the latter simulated an enlarged uterus; the continued growth of the placenta, after the fœtus had died, led to the fatal hæmorrhage. Removal of the sac by abdominal section was impossible.

To contrast with this preparation, we have represented at fig. 349 one from Bandl. The pregnancy had gone on for seven months; fœtal movements and heart sounds were made out. The anatomical relations are given in the figure. The sac was incised through the posterior fornix, and the child extracted by the feet; the placenta was removed immediately afterwards with profuse hæmorrhage; the cavity was washed out and a drainage tube inserted.

SECTION X.

AFFECTIONS OF BLADDER AND RECTUM.

Chapter LI. The Bladder: Anatomy, Physiology, and Methods of Examination.
" LII. Affections of the Bladder and Urethra.
" LIII. Vesico-Vaginal Fistula.
" LIV. The Rectum.

APPENDIX.

Syphilis.
Chlorosis.
Etiology of Uterine Disease.
Case-Taking.
Literature.

INDEX OF AUTHORS AND SUBJECTS.

CHAPTER LI.

THE BLADDER: ANATOMY, PHYSIOLOGY AND METHODS OF EXAMINATION.

LITERATURE.

Chiene—Bladder Drainage: Ed. Med. Jour., 1880. *Croom, J. H.*—On Retention of Urine in the Female: Ed. Med. Jour., April and May 1878. *Hart*—Physics of Rectum and Bladder: Ed. Obst. Trans., 1882. *Næggerath*—Op. cit. *Ogston*—Ed. Med. Jour., 1878. *Power*—Physiology of Micturition: The Practitioner, 1875. *Skene*—Diseases of the Bladder and Urethra in Women: W. Wood & Co., New York, 1878. *Winckel*—Die Krankheiten der weiblichen Harnröhre und Blase: Billroth's Handbuch, Stuttgart 1877.

DISEASES of the bladder are of the greatest importance as they are not only very painful but, for a reason to be given shortly, very intractable. In a manual of the present scope, a full consideration of vesical disease is impossible; we therefore give a mere sketch, and refer the practitioner for details to Skene's or to Winckel's manual.

ANATOMY AND PHYSIOLOGY.

For the anatomy, the student is referred to pp. 27 to 34. We should here only point out that the female bladder, owing to its greater breadth transversely at the base (*v.* fig. 360), is relatively more capacious than that of the male.

Urination. The mechanism of the storage and expulsion of urine from the bladder is full of interest, both from a theoretical and a practical point of view. The urine trickles along the ureters, a result partly due to blood pressure and partly to the peristaltic action of the ureters themselves. It thus reaches the bladder, at this stage an empty flaccid sac with its upper half fitting into the lower calyx-like portion. Gradually the bladder distends, until at last the activity of the motor centre (whose constant action keeps the urethral muscles contracted) is reflexly inhibited, and the urine is expelled by the muscular contraction of the bladder and intra-abdominal pressure. The bladder is now contracted and, on section, has the shape seen at fig. 350—its shape in systole. The bladder then relaxes, *i.e.* becomes flaccid or has its diastole, and once more the urine trickles into it (fig. 27).

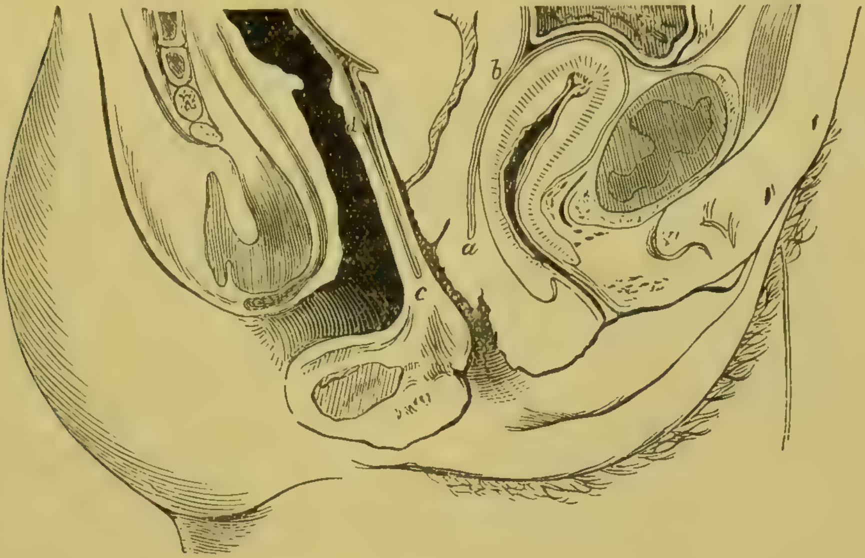


Fig. 350.

Bladder in Systole (Braune).

The bladder therefore has, like the heart, its systole and diastole. A knowledge of this is important practically. It explains the intractability of inflammatory conditions of the bladder, since the bladder when inflamed does not get—what every inflamed organ requires—rest.

The average amounts of the several urinary constituents passed in 24 hours, as given by Parkes, are the following.

Water	1500·000	Grms.
Total solids	72·	
Urea	33·180	
Uric acid	·555	
Hippuric acid	·400	
Kreatinin	·910	
Pigment, &c.	10·00	
Sulphuric acid	2·012	
Phosphoric acid . . .	3·164	
Chlorine	7·00	
Ammonia	·770	
Potassium	2·500	
Sodium	11·090	
Calcium	·260	
Magnesium	·207	

Urine also contains various epithelial scales, a little mucus, nitrogen and carbonic-acid gases.

The reaction is acid, and the specific gravity is 10-20.

METHODS OF EXPLORING THE URETHRA AND BLADDER.

a. *By Catheter and Sound.*

The catheter is passed for the purpose of drawing off the urine, while the sound is usually employed for diagnostic purposes—ascertaining the state of the mucous membrane, the presence of stone or other pathological conditions.

Method of passing the catheter. The instrument to be employed for this purpose is a male gum-elastic catheter, No. 8 or 10. In some special cases, a silver instrument is required. Battey recommends a long rubber catheter as a very useful instrument. The catheter must first be thoroughly washed with carbolic lotion 1-20, and then its end dipped in 1-40 carbolic oil. Cleanliness in the use of the catheter is of the very highest importance, as cystitis and even pyæmia may be caused by putrid urine in old people.

The patient lies on the left side square across the couch, with the hips at the edge and the knees drawn up. The pulp of the index finger of the left hand is passed over the base of the perineal body and onwards until it touches the vestibule. It should then be carried a little backwards until we feel the meatus at the base of the smooth vestibule and in the middle line. The catheter is passed with the right hand; the index of the left hand feels, through the anterior vaginal wall, that it passes into the urethra. After the last drop of urine has been expelled, it is withdrawn and the finger held over its proximal end so as to retain the fluid remaining in the catheter until it can be poured into the receptacle.

The catheter may also be passed with the patient lying on the back; the index of the right hand is carried under the drawn-up right thigh to feel the meatus, and the catheter is passed between the thighs with the left.

Battey's catheter is very convenient, as from its length it reaches to the floor and can be withdrawn without any precaution as to spilling. Further, it is easily cleaned; to do this it is coiled up in a bowl of 1-40 lotion, and then when one end is brought over the edge it empties by syphon action. The indications for the catheter will be given afterwards; at present we only remark that it should never be passed unless necessary, and that the greatest care should be taken not to introduce septic matter.

b. *Digital and Specular exploration of the Urethra and Bladder.*

Owing to the large amount of muscular and elastic tissue in the urethra, it can be stretched to an extent that permits of digital and specular examination of the urethral and vesical lining membrane.

Digital examination. With the patient lying on the left side and under chloroform, the tip of the little finger is placed against the meatus and by a rotary motion passed through it in the direction of the urethral axis. The meatus is the most resistent portion of the urethra; therefore, to aid in its dilatation, some recommend to notch it with radiating nicks. This is unnecessary (A. R. Simpson). By steady pressure, the little finger is first pushed in and then the index one substituted. For exploratory purposes, this is sufficient. To complete the examination, the patient should be turned on the back and the Bimanual done as shown at fig. 73. This is aided by the middle finger in the vagina, and is therefore termed the vesico-vaginal Bimanual.

The presence of stone or of tumours, the state of the mucous membrane of the bladder, the nature of obscure bodies in front of the uterus can all be thoroughly ascertained; vesico-vaginal fistula can be examined, when the vagina has been obliterated; intestino-vesical fistulæ can be detected; calculi, impacted in the vesical portion of the ureters, can be removed; fissures of the neck of the bladder can be stretched; Winckel adds to these that we can open a hæmatometra through the bladder, when its evacuation between the bladder and rectum is impossible—a very rare indication. The Fallopian tubes can also be palpated (Nœggerath); and, in one special instance, Croom proved by this method that the sound had perforated the walls of the thin superinvoluted uterus and not passed along the Fallopian tube.

Simon's method of specular dilatation of urethra. Simon of Heidelberg drew special attention to the dilatation of the urethra by his specula as a means of treatment. The object is to dilate the urethra sufficiently to allow of the passage of calculi, crushed or uncrushed. By it we also destroy temporarily the sphincteric action of the urethra and thus establish an incontinence of urine; this allows to the inflamed mucous membrane, undisturbed now by the frequent muscular contractions which before were necessary to expel the urine, the rest it needs. The difficulty of Simon's method is the risk of causing, by over-stretching, permanent incontinence of urine—a condition as yet incurable.

Simon's specula are shown at fig. 351, and the various sizes at fig. 352. The specula are provided with bulbous plugs, to be used while they are being introduced and afterwards withdrawn. Simon estimated the limit of safe dilatability for the female urethra at various ages as follows :—*Adults*, 6-6·25 cm. ($2\frac{6}{16}$-$2\frac{7}{16}$ in.) in circumference or 1·9-2 cm. ($\frac{3}{4}$ in.) in diameter ; *Young women* (of 15-20 years), 5·6-6·3 cm. in circumference or 1·8-2 cm. ($\frac{3}{4}$ in.) in diameter ; *Girls* (of 11-15 years), 4·7-5·6 cm. ($1\frac{7}{8}$-$2\frac{1}{8}$ in.) in circumference or 1·5-1·8 cm. ($\frac{9}{16}$ in.-$\frac{11}{16}$ in.) in diameter.

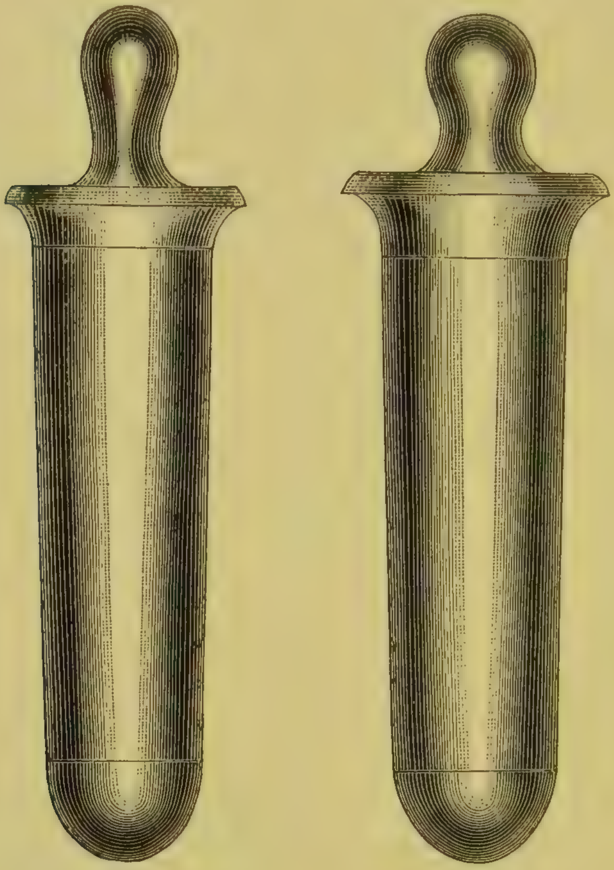


Fig. 351.
Simon's Urethral Specula (Winckel).

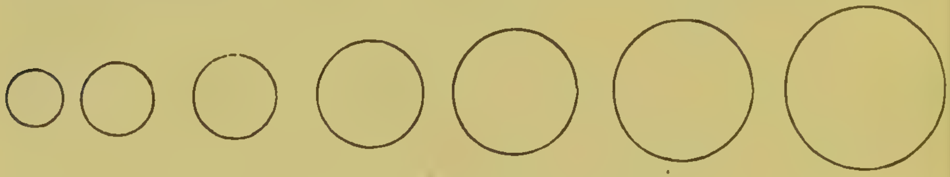


Fig. 352.
The various sizes of Simon's Specula (Winckel).

Practically, we find that the index finger can be passed with safety ;

and that any dilatation beyond an inch diameter is dangerous in regard to permanent incontinence.

Persistent incontinence has attended the extraction of stones with a diameter of 1$\frac{3}{8}$ in., but Dunlap has recorded a case where a stone 2$\frac{1}{8}$ in. in diameter was safely extracted uncrushed through the urethra without consequent incontinence of urine (Am. J. of Obst., Vol. XIV. p. 855).

The dilators of Simon are graduated, and are passed slowly until the desired limit is reached.

It is doubtful if they can, without risk, be used as Simon recommends.

Specular examination by Skene's specula. Fig. 353 shows Skene's specula. Each may be described as a small test tube which fits into a truncated or fenestrated case of vulcanite. The glass tube projects beyond the outer truncated case; and a small mirror can be carried through the inner tube so as to reflect light.

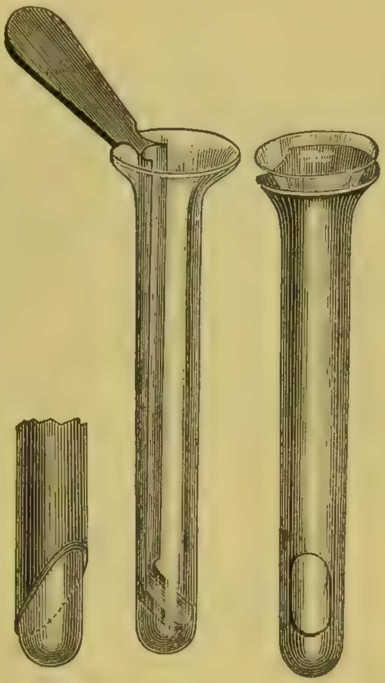


Fig. 353.
Skene's Urethral Specula (Skene).

Skene's directions are to pass the tube (with mirror inside) along the urethra, and to use sun-light or gas-light from a moveable bracket. When a large Skene's speculum is used, the urethra should be first dilated with the index finger. When viewed through the speculum, the mucous membrane of the bladder is somewhat pale.

The hard rubber speculum can be used to make applications.

A specially narrow Fergusson's speculum with a hand mirror is also simple and useful (M. Duncan).

c. *Catheterisation of the Ureter.*

This is by no means an easy operation, but is useful in certain cases. By this means we can ascertain the position of the ureter in operating on vesico-vaginal fistula, and prior to excision of the cancerous uterus; and, in proposed excision of the kidney, can ascertain the state of the other kidney by examination of the urine from it.

Method of Performance. Pass the index finger into the bladder as already described (p. 563); about an inch from the neck of the bladder and at each end of the inter-ureteric ligament, a prominence (in which is the vesical opening of the ureter) can be felt with the pulp of the examining finger. A fine hollow probe is guided into this and its point carried to the side (fig. 354). The urine will now trickle out drop by drop. According to Pawlik, the interureteric ligament can be felt through the anterior vaginal wall when the patient is in the genu-pectoral posture. He thus passes the ureteric catheter without dilating the urethra (Centr. f. Gyn., Oct. 15, 1881).

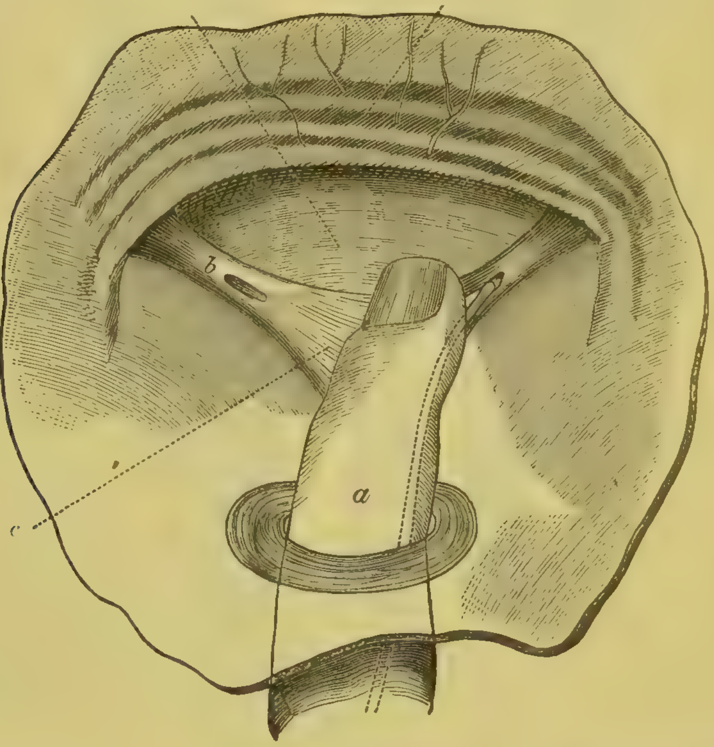


Fig. 354.

Finger passed through urethra into bladder to guide hollow probe into left ureter.
a internal sphincter of urethra, *b* orifice of right ureter, *c* interureteric ligament (Winckel).

CHAPTER LII.

AFFECTIONS OF THE BLADDER AND URETHRA.

For LITERATURE, see Chapter LI.

MALFORMATIONS OF THE BLADDER AND URETHRA.

THESE comparatively rare malformations are easily understood on consideration of the development of the organ.

The bladder is the part of the allantois included by the abdominal plates of the embryo (figs. 311 to 315); the upper portion of the posterior wall of the urethra is formed by Müller's ducts, while the lower is formed by an invagination from the genito-urinary sinus. The developmental defects are therefore the following :—

(1) Total absence of urethra ;
(2) Defect of external portion of urethra—hypospadias ;
(3) Defect of internal portion of urethra ;
(4) Atresia of the urethra (in malformed fœtuses) ;
(5) Extroversion of the bladder from deficient closure of the embryonic abdominal plates.

We would here only note the rarity of these conditions, and refer the practitioner to Skene or Winckel for details.

DISEASES OF THE URETHRA.

Of these the most important are Displacements, Neoplasms, Urethritis, Dilatation, and Stricture.

Displacements of the urethra will be easily understood by reference to those of the bladder.

Neoplasms of the Urethra; Urethral caruncle.

The urethra is liable to be invaded by papillomata, polypi, sarcomata, carcinomata, and vascular growths (angiomata).

Of these last, the most common is the well known Urethral Caruncle.

Pathology. This is a vascular excrescence varying in size from a pin head to a strawberry ; it consists of dilated capillaries in connective tissue, the whole being covered with squamous epithelium. *Physical signs.* A cherry-red tumour, exquisitely tender and vascular, is seen at the urethral orifice (fig. 355). *Symptoms.* These are pain on micturition or even retention of urine, pain on coitus. *Treatment.* Place the patient under chloroform in the lithotomy posture, and destroy the growth by Paquelin's cautery at a dull heat. If bleeding occurs, do not treat it lightly ; plug the vagina, bringing the half of the last strips of lint over the urethral orifice and fixing with a perineal band.

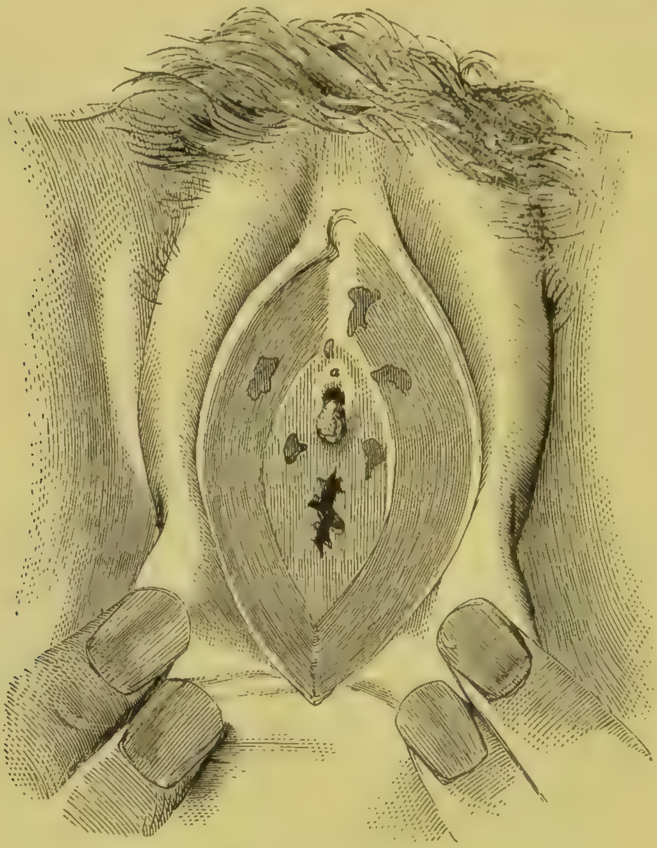


Fig. 355.
Caruncle at urethral orifice (*a*) and, in addition, neuromata in surrounding mucous membrane —see page 510 (Sir J. Y. Simpson).

As regards the other neoplasms, papillomata are painless, sarcomata very rare and their nature settled microscopically, while carcinomata appear as hard peri-urethral tubercles which break down (Skene). In regard to treatment, they may be removed by the curette, or by small loop-snares when high up. We may also have inflammatory changes in Skene's 'tubules' (*v.* p. 29).

Urethritis.

Acute urethritis is usually part of a gonorrhœa. When pus is secreted, the urethra can be felt swollen and tender ; the pus can be squeezed out of the urethral orifice by pressure from above downwards; on passage of the catheter, pain is felt in the urethra although no cystitis be found.

Treatment. Give diluent drinks so as to increase the flow of urine. Copaiba may be given in the form of the well-known Nesbitt's specific :—

℞ Liquoris Copaibæ Co. (Nesbitt) ℥ ij.
Sig. Teaspoonful thrice daily.

Iodoform bougies may be passed in, and counter-irritation applied in the shape of the tincture of iodine over the anterior vaginal wall.

Dilatation and Stricture of the Urethra.

The urethra may be unusually *dilated*, a condition rarely met with; in some cases the dilatation has been caused by coitus, as in malformations of the vagina (*v.* p. 232). The dilatation may be local or general. When it is general, the cautery may be used to burn a vertical furrow, the rest of the urethra being guarded by a speculum.

Stricture of the urethra is a rare condition and readily yields to dilatation by bougies or to incision.

DISEASES OF THE BLADDER.

Of the diseases of the bladder we shall here consider Displacements, Neoplasms, Stone in the bladder, and Cystitis. Vesico-vaginal fistula will be considered in a separate chapter (Chap. LIII.).

DISPLACEMENTS OF THE BLADDER.

The female bladder when empty lies between the pubis and usually to one or other side. It is never exactly central.

From its loose attachment to the pubis, it is pre-eminently displaceable. (1) It is drawn up during labour; and (2) is displaced upwards by retroversion of the gravid uterus, pelvic ovarian or fibroid tumours, and pelvic hæmatocele. (3) It may be adherent to the anterior surface of an abdominal ovarian or fibroid tumour, and may thus be cut into on abdominal section. (4) It is displaced downwards in prolapsus uteri, cystocele, and in the so-called elongation of the supra-vaginal portion of the cervix. (5) In pathological anteflexion of the uterus, the bladder is drawn back and fixed; its systole is thus interfered with, which explains some cases of so-called hysterical retention of urine.

From this mobility it follows that the height of its fundus above the symphysis gives no indication of the amount of urine in the bladder.

Cystocele.

By this we understand a pouching of the posterior wall of the bladder downwards and backwards; the uterus and summit of the bladder are in normal position.

Many a case, regarded as cystocele, is really part of a prolapsus uteri; on the other hand, the so-called "senile prolapsus uteri" is really a cystocele; at the menopause the cicatrisation of the vaginal walls chiefly affects the posterior one, and thus the bladder tends to bulge outwards at the vaginal orifice.

The diagnosis is easily made by the Bimanual and use of the sound. The treatment consists in the use of a ring pessary with diaphragm (fig. 328) or such a one as is seen at fig. 331. Should these fail, the vagina may be packed with oakum or a raw surface (as shown at fig. 339) may be made and stitches applied.

NEOPLASMS OF THE BLADDER.

Pathological anatomy. We may have mucous, fibroid or fibromyomatous polypi. There may also be sarcomatous or carcinomatous disease of the bladder wall, as well as so-called tubercle. The carcinomatous condition is not unfrequent, and is termed by some "villous cancer." It is most common at the trigone, and is held by some authorities not to be malignant. The bladder may be secondarily affected in carcinoma uteri (*v.* p. 429).

Symptoms. These are disturbance of micturition, with bloody and phosphatic urine.

Physical signs. The passage of the index finger into the bladder will show the position, shape, and other characters of the growth.

Treatment. This will vary according to the position, nature, and pediculation or non-pediculation of the growth. Thus it may be twisted off by narrow polypus forceps, snared by a loop of fine catgut, or removed by incision into the posterior wall of the bladder and use of the galvano-cautery or curette (*v.* Stone).

CYSTITIS.

Nature. An acute or chronic inflammatory affection of the mucous membrane of the bladder.

Pathological anatomy. In the acute catarrhal form, we have congestion of the vessels and loss of epithelium; in the chronic catarrhal form, the congestion is duller and there is marked rugosity of the lining of the bladder. The submucous and even the muscular tissues also become affected. The mucous membrane may be ulcerated and the muscular tissue exposed.

The inflammatory process may extend deeper, to the muscular tissue (interstitial cystitis) or to the peritoneum (pericystitis). Occasionally, though rarely, we may have diphtheritic inflammation.

In advanced cases, the patient is usually septicæmic and there is often hydro-nephrosis. In some cases of prolonged retention the mucous membrane may slough off and be passed per urethram, but may be regenerated.

Etiology. The causes are as follows :—Gonorrhœa ; latent gonorrhœa ; exposure to cold ; injury from coitus ; prolonged parturition ; introduction of septic matter by catheter or bougie ; prolonged retention of urine.

Symptoms. In *acute cystitis* the patient has very frequent and painful micturition. In *chronic cystitis* also, there is frequent micturition but accompanied with less intense pain ; there are, further, shooting pains with secondary phenomena—septic, vascular and nervous.

Physical signs. (*a*) *Acute cystitis.* The urine has a low specific gravity, an acid reaction ; the colour is little altered, and mucus is present in excess. On vaginal examination, pain is not felt when pressure is made on the posterior vaginal wall but is felt severely *when the anterior wall is touched.*

(*b*) *Chronic cystitis.* The urine has a low specific gravity, is usually alkaline, and is often offensive ; it contains pus, epithelium, phosphates and bacteria ; albumen, derived from the pus, is present. The vaginal examination gives the same results as in acute cystitis. If the finger be passed through the urethra (*v.* p. 563), the roughened condition of the lining membrane is felt ; crystals of phosphate and marked rugosities can also be detected.

Prognosis. In both acute and chronic cystitis, the prognosis is not good ; the treatment is difficult, and in bad chronic cases the patient's strength sometimes becomes exhausted and septicæmia may cause death.

Treatment. (*a.*) *Acute cystitis.* Put patient on milk diet, and give Friedrichshall or Carlsbad water freely. Diluent drinks may be taken *ad libitum.*

The following prescription is useful.

℞ Potassæ Bicarbonatis	ʒ iss.
Tincturae Hyoscyami	℥ i.
Infusum Buchu	
vel Pareirae	℥ vj.
vel Uvæ Ursi ad	

Sig. Tablespoonful thrice daily

In gonorrhœal cystitis, the following may be substituted.

℞	Liquoris Copaibæ Co. (Nesbitt)	℥ij.
	Sig. Teaspoonful thrice daily.	

If the pain is very acute give morphia suppositories (¼ grain) at night, omitting the mixture with the hyoscyamus if necessary.

For (*b.*) *chronic cystitis,* we recommend the following treatment *seriatim.*

1. Put on milk diet with abundant fluids, and purge freely. Give

℞	Acidi Nitrici diluti	ʒiij.
	Tincturae Hyoscyami	℥i.
	Infusum Buchu ad	℥vj.
	Sig. Tablespoonful thrice daily.	

The hyoscyamus eases the pain; and the nitric acid corrects the alkaline phosphatic urine, for which also benzoate of ammonia is admirable.

℞	Ammoniae Benzoatis	ʒiii.
	Aquæ	℥vj.
	Sig. Tablespoonful thrice daily.	

The benzoate of ammonia is converted into hippuric acid and corrects alkalinity. Nesbitt's specific is also useful.

2. If this fail, then wash out bladder as often as possible by means of double catheter, such as Skene's; use weak boracic lotion, or carbolic lotion; inject with the douche or Higginson's syringe. Paint anterior vaginal wall with tincture of iodine.

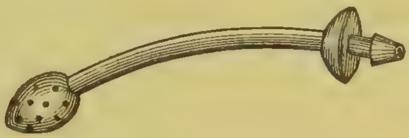


Fig. 356.

The Skene-Goodman self-retaining catheter; an india-rubber bag can be worn with it (Skene).

3. A long (winged) india-rubber catheter may be kept in the bladder so as to drain off the urine constantly and give the bladder rest. The patient need not remain in bed if the Skene-Goodman catheter (fig. 356) is used.

4. In obstinate cases, the formation of an artificial vesico-vaginal fistula may be tried. To do this, chloroform the patient; place her in the lithotomy posture and apply Sims' speculum. Open into the bladder through the anterior vaginal wall, in the middle line, with Paquelin's cautery at a dull heat. This may also be done with the scissors, as follows: pass the finger into the bladder, and then by

means of a pair of straight scissors cut it open in the middle line. Preliminary dilatation of the urethra with the finger enables the operator with certainty to avoid cutting into it. The advantage of the cautery is that the wound does not readily unite; when the opening is made with knife or scissors, care is required to prevent its healing.

The urine trickles through the artificial fistula; in this way, the bladder gets complete rest and can be thoroughly washed out.

After some months the fistula is easily closed, as in the operation for vesico-vaginal fistula. Severe cases of cystitis will tax, more than any other disease, the practitioner's patience and knowledge. It is well to keep in mind the reason of this intractability, *viz.*, the inability of the bladder to remain at rest.

As can be seen from what has gone before, the principles of treatment are the following:—(1) to correct abnormalities in the urine; (2) to allay the irritability of the bladder; (3) to lessen the congestion of the bladder by purgatives and counter-irritants, and to render the urine bland and lessen the work of the kidney by milk diet; (4) to allay the irritable condition of the bladder by injection; (5) to give it complete rest by a permanent catheter or, in extreme cases, by an artificial fistula.

CALCULI AND OTHER FOREIGN BODIES IN THE BLADDER.

The female bladder is liable to receive foreign bodies from three sources.

A. Calculi from the kidneys—uric acid, oxalates, phosphates or cystine.

B. Substances from neighbouring organs—pus from pelvic abscess, concretions from the intestines, bones from an extra-uterine fœtation, pessaries from the vagina, echinococci and other parasites such as those associated with chyluria.

C. Foreign bodies introduced wilfully into the bladder by patients of depraved taste; these often form nuclei for stones (fig. 356*).

Of these, *calculi* are the most important. Stone is less common in the female than in the male, as small calculi can pass along the dilatable female urethra; occasionally, therefore, the gynecologist has to remove from the urethra small stones impacted there—usually at the meatus urinarius. The introduction of foreign bodies, which act as nuclei, is more common in the female.

Symptoms. These are severe pain in micturition, especially at the close; alterations in character of urine; blood in urine.

Physical signs. The stone, when at all large, can be easily detected bimanually; when any doubt exists, the use of the sound or the passage of the finger into the bladder renders the diagnosis easy.

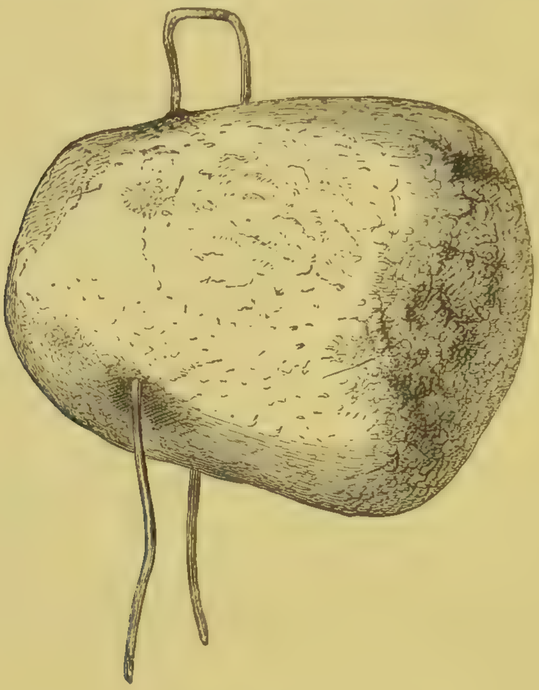


Fig. 356*.

Large stone, which formed round a hair-pin as nucleus, extracted by vaginal lithotomy (Angus Macdonald).

Treatment. Measure the stone: if it be less than an inch, it may be extracted through the urethra dilated first by the finger or Simon's specula; if greater than an inch, then dilate the urethra and crush; if very large or hard or if it have a nucleus, extract by vaginal incision. This incision may be stitched up after the operation, or kept open when the bladder has been much irritated; it can afterwards be stitched as in vesico-vaginal fistula.

For other foreign bodies, the urethra can be dilated and the substance grasped by polypus forceps or manipulated out. When large, they may be extracted as in the case of large stones.

FUNCTIONAL DISEASES OF BLADDER.

By these we understand derangements of the bladder in regard to urination. Either these are due to causes as yet unascertained, or the same derangement (*e.g.*, retention) is associated with many lesions.

The chief functional diseases are these—

Irritability,
Incontinence,
Retention.

In regard to all of them, we may remark that in no case should the diagnosis of a functional disease of the bladder be made until the practitioner is satisfied that there is no organic lesion.

Irritability. In this, frequent micturition associated with disagreeable feeling is present. It may be due to excessive acidity of the urine but is often a nervous affection. When it is due to excessive acidity, give lithia or potash.

℞ Lithiae Carbonatis gr. v.
Fiat pulv. mitte tales vj.
Sig. One thrice daily.

Incontinence, or inability to retain urine, is most common in little girls; occasionally we meet with it in adults, as the result of prolonged labour or as a permanent condition from infancy.

In the incontinence of girls, note whether there be any irritability of the genitals (vulvitis) or ascarides. Goltz found that, where section of the spine in the dog above the lumbar enlargement had produced retention of urine, he could make it urinate by sponging the anus with cold water; a reflex impulse passed from the rectum, inhibiting the activity of the motor centre and causing bladder contraction. In a child, ascarides in the rectum will act in the same way when it is asleep.

Treatment. Treat the irritating cause—as vulvitis or ascarides. If no irritating cause be detected, then give belladonna.

℞ Tincturæ Belladonnæ ʒij.
Sig. Three drops thrice daily.

In strumous cases, give syrup of the iodide of iron or cod liver oil.

℞ Syrupi Ferri Iodidi ℥ij.
Sig. Thirty drops thrice daily.

Retention of Urine. Palpation shows a fluctuating mesial tumour rising into the abdomen; the position of the fundus of the bladder gives no indication of the amount of urine, as it may be tilted up by retroversion of the gravid uterus. Remember that a bladder may be distended so as to be as large as a six or eight months' pregnancy, and that constant dribbling-away of the urine may be a symptom of retention. Examine the pelvis for an organic lesion.

Retention may be due to one of three great classes of causes:—

Hysterical,
Reflex,
Mechanical.

1. *Hysterical.* By this we mean that from perversity or a prurient desire to have the catheter passed, a patient feigns inability to pass urine.

The treatment is to give a hot hip-bath followed by a cold one; if the catheter is needed, get it passed by a nurse of unsympathetic tendencies.

2. *Reflex* causes are the following:—

(1) Gonorrhœa;
(2) Urethritis;
(3) Irritable caruncle;
(4) Carcinoma, urethral and vaginal;
(5) Perineal and especially vestibular tears after labour, tears of cervix;
(6) Ligature of internal piles.

The treatment is hot applications in (1), (2), (3), and (5) and (6); and the catheter in (4). Remove the source of irritation when possible.

3. *Mechanical.* These are pressure of fibroids, retroversion of the gravid uterus; ovarian or parovarian tumours (pelvic and retro-uterine).

Where the tumour is impacted in the pelvis, a silver male (No. 10) catheter will pass best. The urethra is compressed, the bladder bulging over the symphysis; accordingly, a rigid instrument whose handle can be carried to the perineum is good.

CHAPTER LIII.

VESICO-VAGINAL FISTULA.

LITERATURE.

Baker Brown—Surg. Diseases of Women, 3d Ed., p. 133; and Lancet, March 1864. *Bandl*—Wiener Med. Woch., 1875, Nos. 49 to 52; and 1877, Nos. 30 to 32. *Bozeman*—Remarks on vesico-vaginal fistula, 1856; Americ. Journ. of Med. Science, July 1870; Obst. Journ. of Great Britain, June to Aug. 1878. *Byford*—Medical and Surgical Diseases of Women: Philadelphia 1882. *Emmet*—On vesico-vaginal fistula: New York 1868. *Hegar and Kaltenbach*—Op. cit., S. 582. *Simpson, Sir J. Y.*—Op. cit., p. 30. *Sims, Marion*—On the treatment of vesico-vaginal fistula: Americ. Jour. of Med. Science, Jan. 1852. Silver Sutures in Surgery: New York 1858. *Simon*—Ueber die Heilung der Blasenscheidenfisteln; Giessen 1845, and Rostock 1862: Wiener med. Wochenschrift 1876, Nos. 27-32. *Winckel*—Die Krankheiten der weiblichen Harnröhre u. Blase: Stuttgart 1877, S. 95.

PATHOLOGICAL ANATOMY AND VARIETIES.

The septum between the urinary and genital tracts may be broken through at various points. According to their situation, we have the following varieties of urinary fistulæ:—

Urethro-vaginal,
Vesico-vaginal,
Vesico-uterine,
Uretero-vaginal,
Uretero-uterine.

The situation of these is sufficiently indicated by their names, and will be easily understood by reference to fig. 357.

A urethro-vaginal fistula rarely occurs alone, but is sometimes present along with a vesico-vaginal one. It lies in the middle line and is, naturally, of small size.

By far the most frequent are the vesico-vaginal fistulæ. They may occur at any point of the vesico-vaginal septum, which measures in height (from the internal orifice of the urethra to the vaginal fornix) about 5 cm. and in breath 4 cm. (Kaltenbach). Their size varies from a pin-point or slit-like hole to a large oval (fig. 362) or four-cornered (fig. 384) aperture. When recent they are of larger size, but after some months become contracted through the formation of cicatricial tissue. The *margins* of the *fistula* are at first irregular, swollen, and ulcerated; but after a time they become thin and firm, through cicatrisation: these changes have an important bearing on treatment. Jobert divided fistulæ in the anterior fornix into *superficial* and *deep*; in the former (fig. 358) the anterior lip of the cervix was not implicated, in

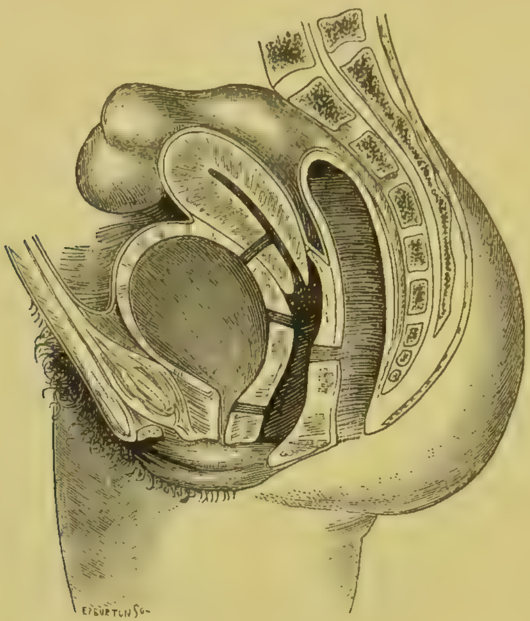


Fig. 357.

To represent the chief varieties of urinary fistula—urethro-vaginal, vesico-vaginal, and vesico-uterine. Those with the ureters are not seen. The seat of a recto-vaginal fistula is indicated (de Sinéty.)

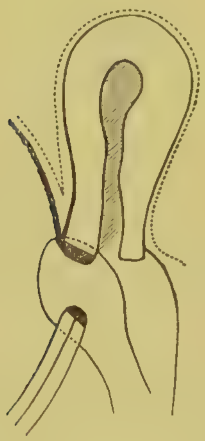


Fig. 358.

Superficial vesico-vaginal fistula, the cervix is intact (Hegar and Kaltenbach).

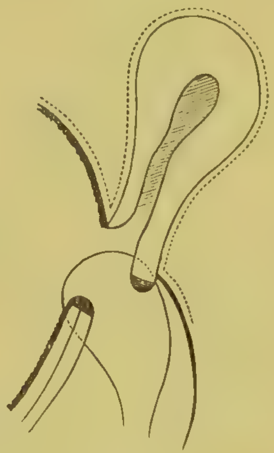


Fig. 359.

Deep vesico-vaginal fistula, the anterior lip o the cervix is destroyed (H. and K.).

the latter it was more or less destroyed (fig. 359). In cases of fistulæ which allow a free flow of urine, the *bladder* becomes permanently contracted and its walls thickened; in large fistulæ, the mucous membrane protrudes through the opening and is easily recognised from its deep red colour. The normal relation of the openings of the *ureters* to that of the urethra and to the cervix uteri (fig. 360) renders them liable to be involved in an extensive fistula, or even in a small one lying to one side of the middle line. Sometimes we can recognise their openings on the exposed vesical mucous membrane by means of the urine trickling from the orifices; should the urine be bloodstained, it can be distinguished from blood by its acid reaction to test paper. The *urethra*, through disuse, becomes contracted; sometimes complete atresia is present and seriously complicates treatment, and a portion of the canal may even be completely destroyed by pressure (*v.* fig. 389). The *vagina* is often contracted by cicatricial tissue originating from injuries received during labour. The margins of the fistula are often drawn apart, and sometimes fixed down to the bone, by these cicatrices; this interferes with their closure. Contraction of the vagina below the fistula sometimes makes it impossible to ascertain the condition of the upper part and whether the uterus communicates with the fistulous tract. The relations of the *peritoneum* to fistula are shown in fig. 361, from which it is evident that only in the repair of very extensive fistulæ would its relations require to be considered. The difficult labour which leads to the production of the fistula is liable to be followed by puerperal peritonitis or cellulitis; these may disturb the normal relation of the peritoneum.

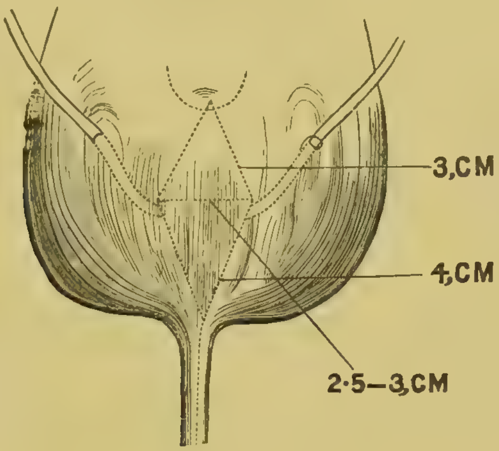


Fig. 360.

The normal relation of the cervix, the ureters, and the urethra (H. and K.). From cervix to orifice of ureter measures 3 cm., from orifice of ureter to that of urethra measures 4 cm., from orifice of one ureter to that of the other measures 2·5 to 3 cm. The ureters run through the bladder wall in an oblique direction downwards and inwards, for from 1·5 to 2 cm.

Vesico-uterine fistulæ are rare. From their position they can be recognised only after dilatation of the cervical canal (*v.* fig. 388), and it is evident that they must be very small.

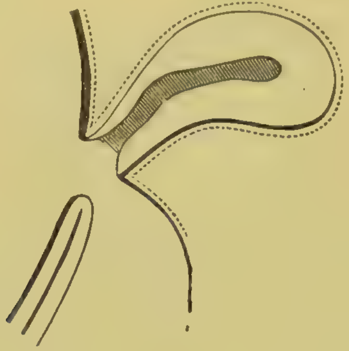


Fig. 361.

Relations of peritoneum, indicated by dotted line, to a fistula which has destroyed the whole of the anterior wall of the cervix and the infra-vaginal part of the posterior wall (H. and K.).

Uretero-vaginal fistulæ are situated in the fornix vaginæ. They are of small size, admitting only the point of the sound, and have either sharp edges or open at the point of a small papilla.

Of uretero-uterine fistula, only 9 cases are on record (Kaltenbach).

ETIOLOGY.

Malignant disease is the most common cause of fistula (*v.* p. 429); but we place this form aside, as it is beyond treatment and merely indicates a stage in the progress of the malignant growth.

The most important cases of fistulæ which we have to consider here, arise through *injury received during labour.* This injury may act *directly*, producing laceration of the septum; more frequently it acts *indirectly*, producing necrosis secondary to pressure or inflammation. The causes which predispose to fistula are a narrow pelvis and pendulous abdomen, a firm or large head (hydrocephalus) and face presentations (Winckel). The immediate cause is the compression of the soft parts between the child's head and the bony wall of the pelvis; if this pressure continues for a long enough time, it destroys the vitality of the soft parts which afterwards separate as a slough.

Fistulæ produced by instruments are situated in the lower part of the vagina, and are accompanied with extensive cicatrices and adhesions; those due to pressure of the fœtal head are placed in the upper part (Winckel). In craniotomy, the soft parts have been sometimes lacerated by the instruments, or by splinters of fœtal bone. Forceps are often cited as a cause of the injury. It is not however *the use* of the forceps after a prolonged labour which is to blame, but the *not using* of them at an early period—before the parts have been destroyed by pressure.

Fistulæ have followed diphtheritic inflammation in the puerperium, but this is rare. Inflammation and ulceration round badly fitting pessaries have also produced them.

SYMPTOMS.

The leading symptom is the *involuntary flow of urine* from the vaginal orifice. *This will not appear until the slough separates,* that is till about the third or fourth day; its separation may be delayed for three or four weeks, when the necrosis is secondary to puerperal vaginitis (Byford). When a direct laceration has been produced, the urine will flow *at once* per vaginam; but even here it may escape notice till the second or third day, as it is masked by the lochial discharge.

The power of retaining varies, in certain cases, with the position of the patient; with a fistula situated high up, the erect posture allows the lower portion of the bladder to be used though the flow is continuous in the recumbent posture. With a urethro-vaginal fistula, there may be perfect continence from a sphincter-like action of the muscular fibre in the wall of the urethra; the patient observes, however, that the urine does not pass by the urethral orifice.

Secondary symptoms are due to a constant wetting of all the surrounding parts with the urine. The urinous *odour* is quite characteristic in urinary fistula; there is *excoriation* round the vulva, the inside of the thigh is red and irritated. *Menstruation* is generally in abeyance, returning after the fistula has been cured. There is usually *sterility;* although cases of conception, often followed by abortion or premature labour, have been recorded. The disagreeable surroundings interfere with the appetite and digestion; there is *constipation,* which Freund has ascribed to increased secretion by the kidneys but which is more probably due to reflex contraction of the muscular fibre of the rectum (Winckel). The general health thus becomes seriously impaired so that the patient is willing to submit to any operation which promises relief.

DIAGNOSIS.

The irritated appearance of the external genitals with the characteristic odour at once indicates that there is fistula, but the diagnosis of its position is often very difficult.

Urethro-vaginal and *vesico-vaginal. When large,* these may be felt by the examining finger; on our passing the sound into the bladder the finger touches it through the fistula. The speculum shows their position and extent, and reveals smaller ones which escape detection with the finger; by stretching the folds of the mucous membrane with tenacula, we may detect a fistula concealed by them.

To recognise *small vesico-vaginal* fistulæ and to differentiate them from the *vesico-uterine* and *ureteric*, proceed as follows:—pass Sims' speculum, carefully wipe away all mucus from the anterior vaginal wall, clear out the cervical canal with a dressed sound and plug it with a pledget of dry cotton wadding; now pass a catheter, and through it distend the bladder slowly with a coloured fluid such as milk or permanganate of potash; as the bladder distends, watch carefully the anterior vaginal wall for any oozing of the fluid (Winckel). If there is no oozing, the fistula is not vesico-vaginal. If on withdrawing the plug from the cervix it be found stained with fluid, the fistula is *vesico-uterine.* If neither of these forms be present, the urine must come from a *ureteric* fistula; the rarity of this form should lead us to suppose that the fluid may have been temporarily kept from escaping from the bladder by a valvular action of the mucous membrane, and the examination should be repeated after a time. In a case of uretero-uterine fistula, Bérard collected the urine which escaped per vaginam in one vessel and that in the bladder was drawn off per urethram by a catheter into another; the quantities in a given time were found to be equal. His conclusion was that he had obtained the secretions from each kidney separately, so that the fistula was ureteric.

PROGNOSIS.

A natural cure will depend on the recentness of the fistula and its size. Small fistulæ, if kept clean, heal of themselves during the puerperium. Large ones require operative treatment; cure by this means depends partly on the size of the fistula, but more on the condition of its margins—whether they contain much cicatricial tissue, and whether they are bound down.

TREATMENT.

There are two essentials for successful operative treatment: (1) complete exposure of the fistula, so that (2) the edges may be thoroughly pared and carefully adapted with sutures. The great difficulty lies in the inaccessibility of the field of operation, to which the failure of the older operative measures is chiefly to be attributed.

Marion Sims (1849) first rendered successful treatment really possible by the complete exposure of the fistula with his *speculum,* and by the careful adaptation of its margins with *silver-wire sutures.* To Simon of Heidelberg is due the credit of having elaborated the operation, and of

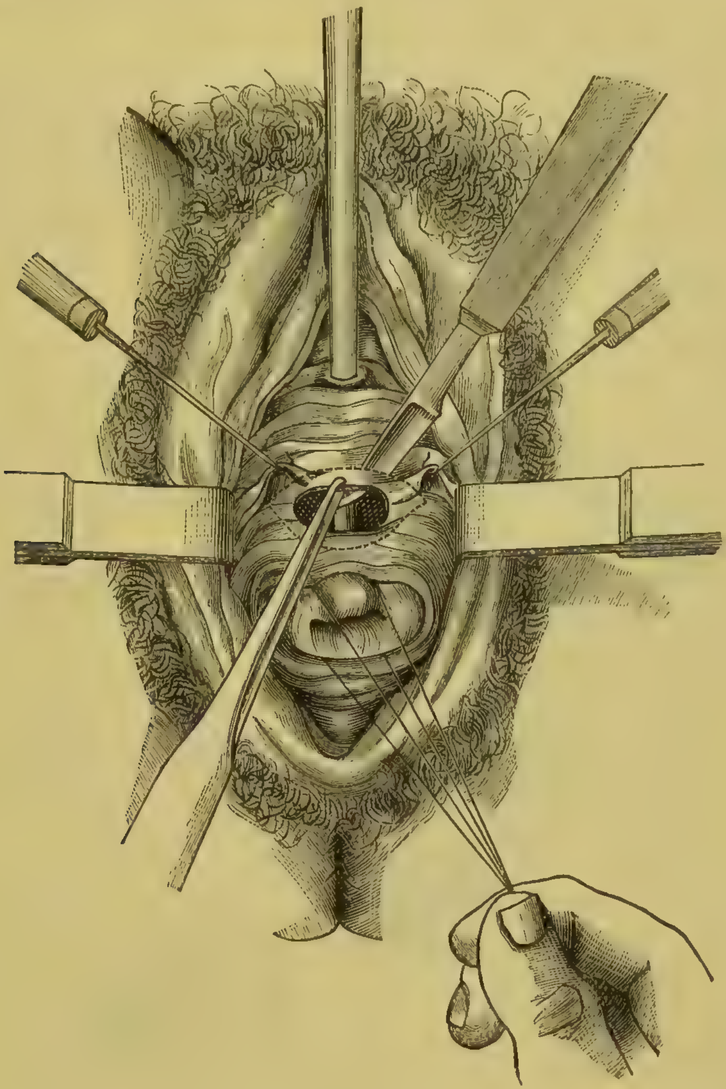


Fig. 362.
Method of paring the edges of a fistula (Simon).

having extended its sphere so that almost no form of fistula has in his hands proved incapable of treatment. We may shortly contrast the methods of these two leading operators as follows: Sims pares the edges of the fistula in a sloping manner (fig. 364) carefully avoiding the mucous membrane of the bladder, then adapts the margins of the fistula with silver wire, and drains the urine continuously per urethram through a catheter; Simon pares away the edges vertically not specially avoiding the mucous membrane of the bladder, unites the edges with silk sutures, and encourages the patient to pass water unaided from the first—drawing it off with the catheter only when necessary. Bozeman, a pupil of Sims, has drawn attention to the advantages of the genu-pectoral posture in operating and to the importance of preparatory treatment by dividing

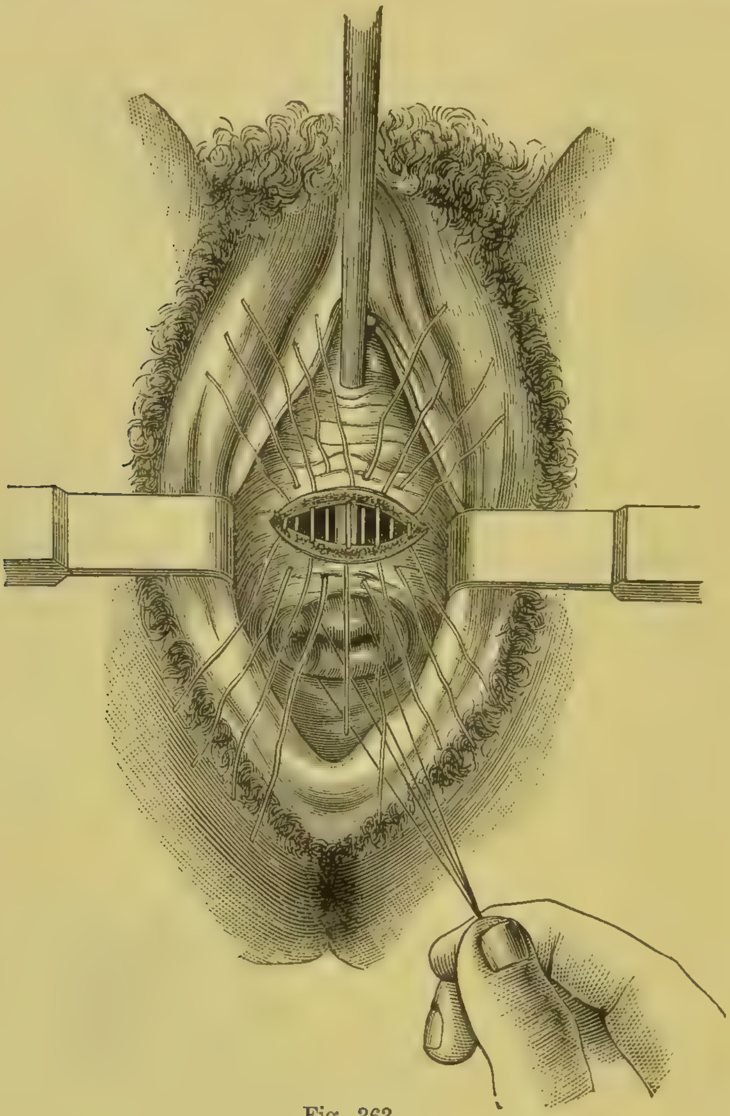


Fig. 363.
Sutures passed in a case of urinary fistula (Simon).

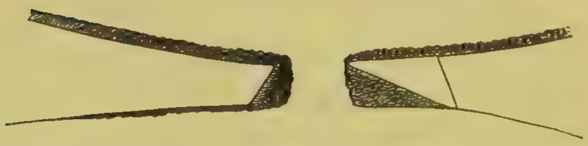


Fig. 364.
The American and German methods of paring the edges of fistulæ contrasted; Sims' is shown on the right margin of the fistula, Simon's on the left. The mucous membrane of the bladder is above, that of the vagina is below. The edges may be pared first according to Sims' method, and if a raw surface is not thus obtained the tissue can be removed up to the fine line (Kaltenbach).

and stretching cicatricial contractions; he fixes the sutures with lateral plates and buttons.

When a fistula has been discovered during the puerperium our first aim is to *aid the natural effort at cure.* A catheter (fig. 390) is placed in the urethra to carry off the urine by the natural passage; the vagina is syringed out occasionally with warm water; the edges of the fistula may be kept together, in some cases, by tampons suitably placed in the vagina.

If the fistula does not close by the natural process, we have recourse to operation.

Operation for Vesico-Vaginal Fistula.

There is difference of opinion as to the *time for operating.* According to Hegar and Kaltenbach, the best time is 6 to 8 *weeks* after the confinement; 'the lochial discharge has ceased, the necrosis of the tissues is defined, the margins of the fistula are vascular and juicy and are at the same time of sufficient firmness to hold the sutures;' the cicatricial tissue which forms round the margins makes the operation more difficult afterwards. Marion Sims delays the operation for a few months.

Under the operation, we shall describe—

1. Preparatory treatment;
2. The operation, which consists of (*a*) the paring of the edges of the fistula and (*b*) their adaptation with sutures;
3. After-treatment.

1. *Preparatory treatment* is only necessary when there are cicatricial bands drawing the margins of the fistula apart or contracting the field of operation. These must be divided and made to heal over a glass plug, or the vagina must be kept distended with air-bags. Frequent vaginal injections are necessary in all cases, to bring the edges into as good condition as is possible.

2. For *the operation* itself the following instruments are required.

Sims' speculum,
Spatulæ,
Three or four tenacula,
Blunt-hook,
Vaginal douche for permanent irrigation,
Hot water to check hæmorrhage,
Dissecting and artery forceps,
Small bistouries straight or set at an angle—on long handles,
Bozeman's scissors,

Several small sponges and sponge-holders,
Short curved needles and needle-holder,
Curved needles on fixed handles,
Silver wire (cat-gut in reserve),
Wire twister.

Good light is essential and as *complete exposure* of the field of operation as is possible ; this last will determine the *position* of the patient, according as Sims' or the lithotomy posture allows us to get more readily at the fistula. The drawing down of the cervix with volsella or sutures (fig. 362), or the protrusion of the edges of the fistula by a catheter in the bladder, is of use in some cases ; where the mucous membrane of the bladder (by prolapsing through the fistula) comes in the way, it can be kept back by the sound in the bladder or a sponge probang pushed through the fistula (Sir J. Y. Simpson).

Chloroform is always an advantage, as it gives the operator more freedom in exposing the parts and prevents the patient from moving; the actual pain of the operation does not demand it.

Three *assistants* are essential—one to give chloroform, a second to hold the speculum, a third for the sponges ; six are better, as two are required with the patient in the lithotomy posture and there is one to take charge of the instruments. The knives employed are shown at figs. 365-67. The sponges should be very small and fitted on holders of which a convenient form is shown at fig. 368. Fixed *needles* are required when the tissue is dense. Sir J. Y. Simpson introduced the tubular needle seen at fig. 369, which is sometimes of great service.

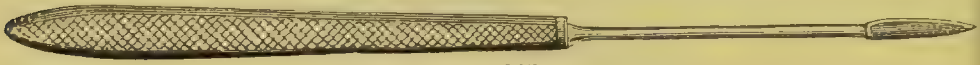


Fig. 365.

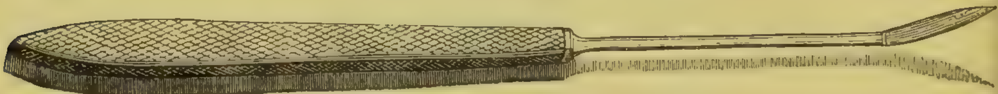


Fig. 366.

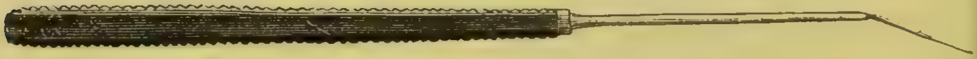


Fig. 367.

Knives for paring a fistula. Fig. 365, straight knife; fig. 366, bent knife which is shown laterally at fig. 367 (Sir J. Y. Simpson).

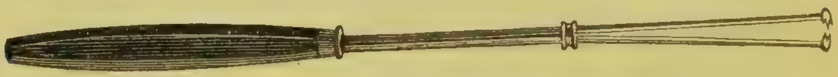


Fig. 368.
Sponge-holder.

(*a*). *The paring of the edges of the fistula.* To produce union, it is

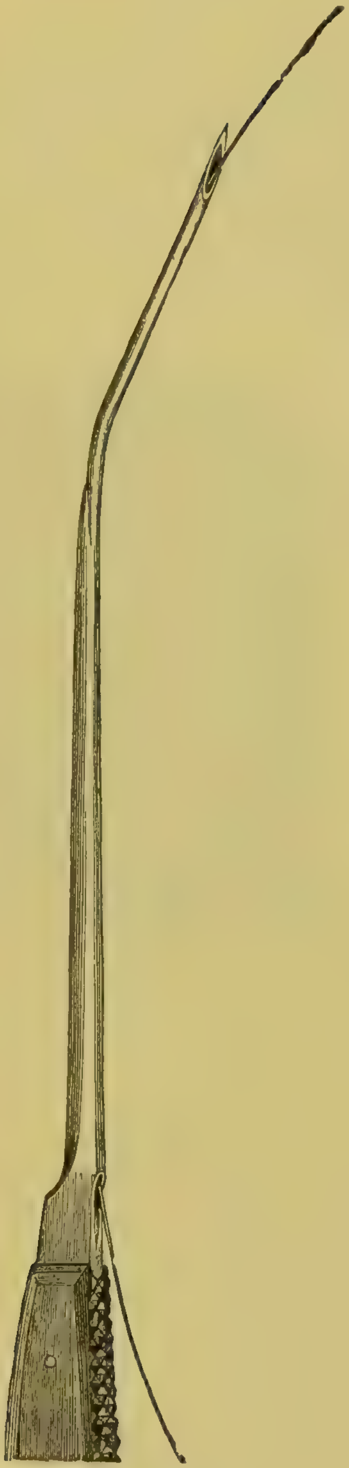


Fig. 369.
Sir J. Y. Simpson's tubular needle for vesico-vaginal fistula (Sir J. Y. Simpson).

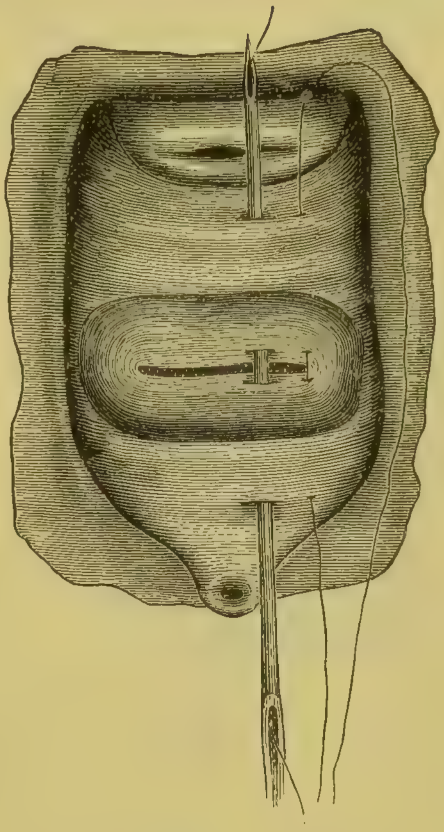


Fig. 370.
Passage of the thread with the tubular needle (Sir J. Y. Simpson).

essential to have *a continuous raw* surface all round the margin. To procure this, we hook up with a tenaculum the portion of vaginal mucous membrane to be removed and transfix it with the knife (*v.* fig. 362 and fig. 371). The knife should not pass through the mucous membrane of the bladder, unless there be so much cicatricial tissue that a large piece requires to be cut out; the reason for avoiding the vesical mucous membrane is to prevent after-hæmorrhage into the bladder. In small fistulæ, we can remove the tissue in a ring and thus ensure a continuous raw surface (Sir J. Y. Simpson); in larger fistulæ, we may have to clip portions away with scissors (*v.* fig. 109).

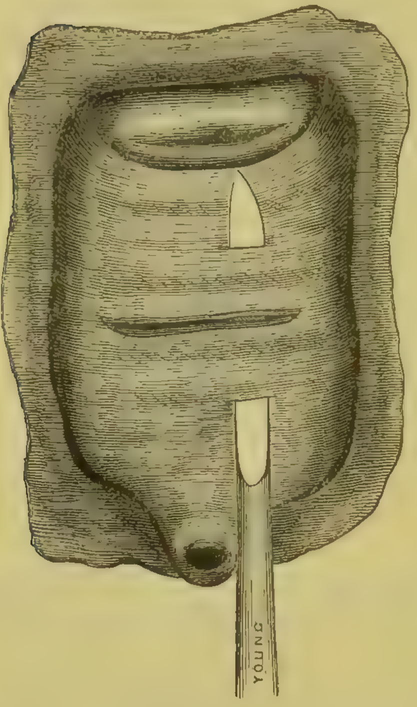


Fig. 371.

Transfixing with a knife both edges of the fistula at once (Sir J. Y. Simpson).

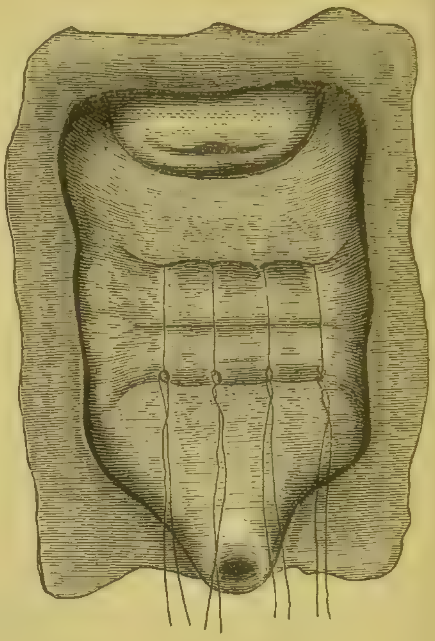


Fig. 372.

Fistula shown at figs. 370 and 371 closed with sutures (Sir J. Y. Simpson).

Another method of making a raw surface is to split up the edges so that the vesical mucous membrane is separated from that of the vagina; the advantage of this method is that no tissue is lost.

Hæmorrhage is best checked by hot douche; large bleeding points may require twisting or even ligature.

(*b*). *The adaptation of the edges with sutures* must be carefully done. The sutures may be passed on an ordinary curved needle, a fixed needle (which is made to transfix both margins of the fistula and then threaded), or a hollow needle (fig. 370). To prevent the sutures from cutting the vaginal mucous membrane as they are drawn through, the fork or pulley (figs. 373, 374) can be used. The sutures must be pretty close together

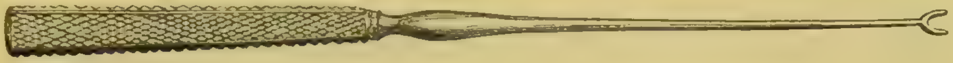


Fig. 373.

Bozeman's fork used in drawing through the wires to prevent their cutting the vaginal mucous membrane (Sir J. Y. Simpson).

and should either not pierce the vesical mucous membrane or should take in only its margin. When the tissues are dense, counterpressure against the point of the needle may be made with a blunt hook as in fig. 375. Sims passes a silk thread first, and then uses it to draw through the wire suture.

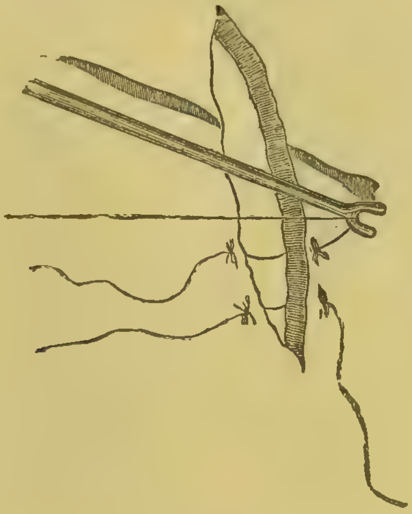


Fig. 374.

Method of use (Emmet).

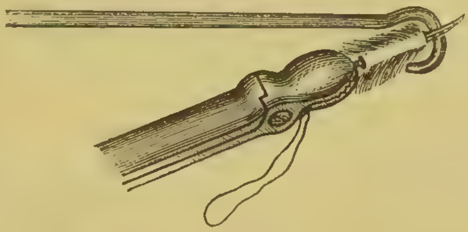


Fig. 375.

Mode of applying counter-pressure to the point of the needle by means of a blunt hook (Emmet).

After all the sutures are passed, they are tied (fig. 377) or twisted (figs. 376, 380); to bring the wires together we can use Bozeman's suture-adjuster (fig. 378); the wire twister (devised by Coghill) is very convenient for twisting the wires close, especially when the fistula is deeply placed and not very accessible (fig. 379). Bozeman uses a

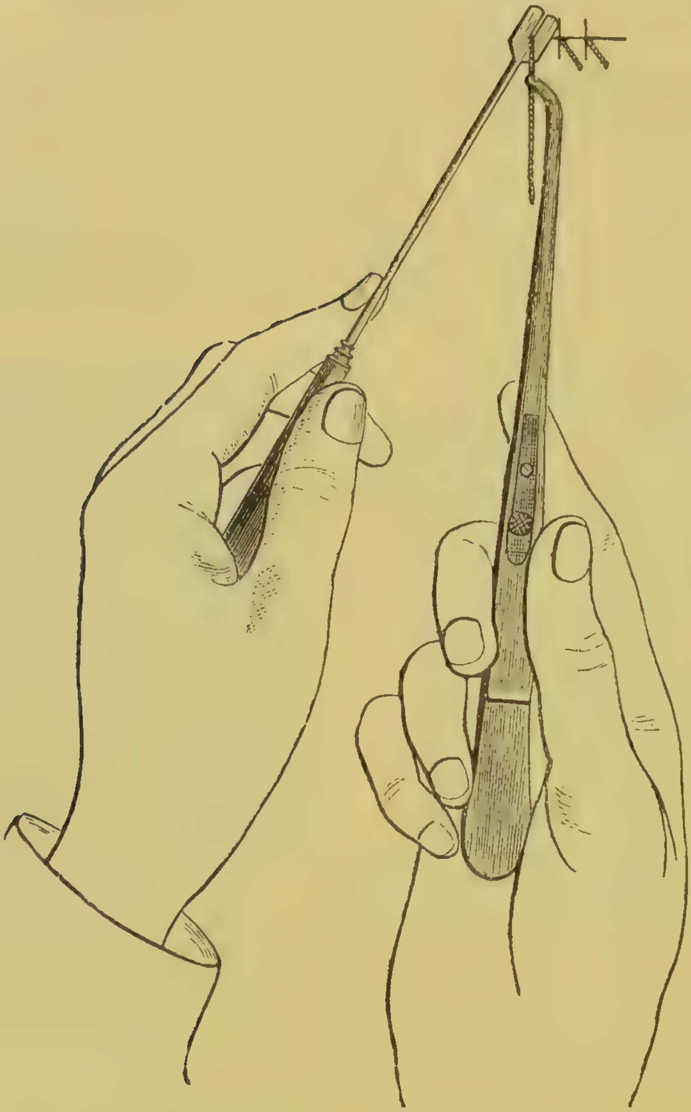


Fig. 376.

Sims' method of fixing and twisting the sutures (after Sims).

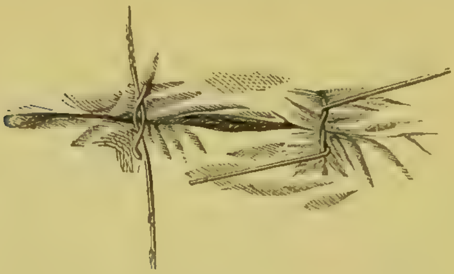


Fig. 377.

Mode of tying silver-wire sutures (Sir J. Y. Simpson).

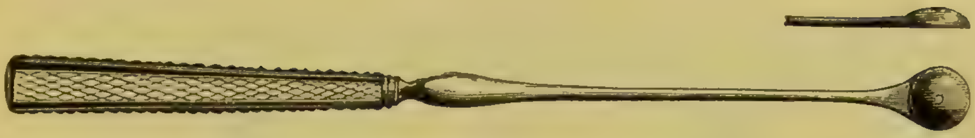


Fig. 378.
Bozeman's suture-adjuster (Sir J. Y. Simpson).

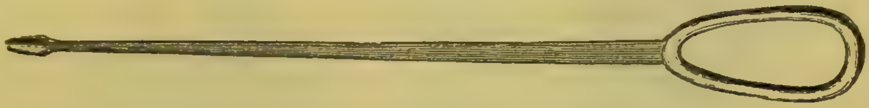


Fig. 379.

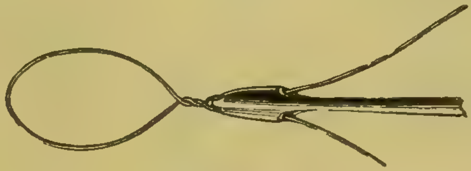


Fig. 380.
Coghill's wire twister, fig. 379; its point threaded with a wire is shown at fig. 380 (Sir J. Y. Simpson).

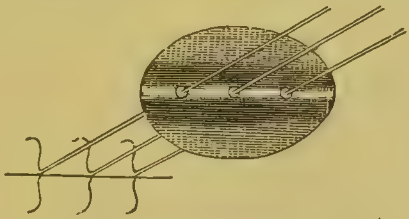


Fig. 381.

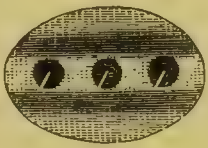


Fig. 382.
Wires drawn through Bozeman's plate, fig. 381; fixed with shot as in fig. 382 (Sir J. Y. Simpson).

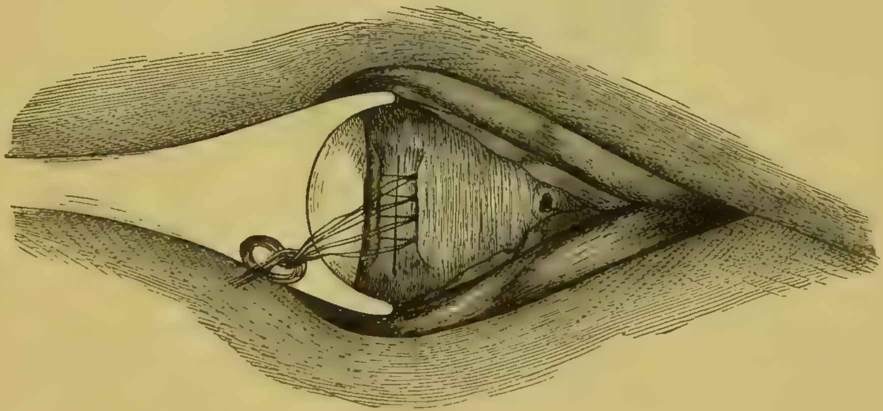


Fig. 383.
Speculum passed for removal of sutures; the patient is on her side (Sir J. Y. Simpson).

plate to fix the sutures. The fistula seen at fig. 370 is shown, after the sutures have been twisted up, at fig. 372. With a triangular fistula the closed wound will be Y-shaped, while a quadrilateral fistula will give a I-shaped wound (figs. 384, 385).

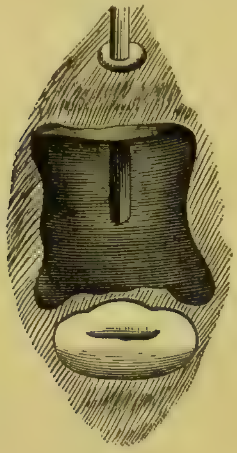


Fig. 384.

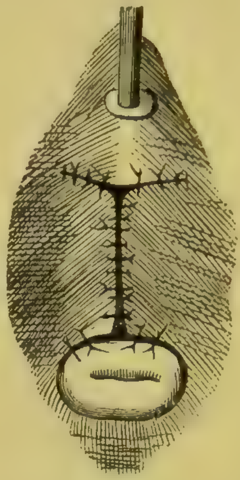


Fig. 385.

Four-cornered fistula fig. 384, closed by sutures in fig. 385 (Hegar and Kaltenbach).

In the case of fistulæ situated close to the cervix, we make use of the

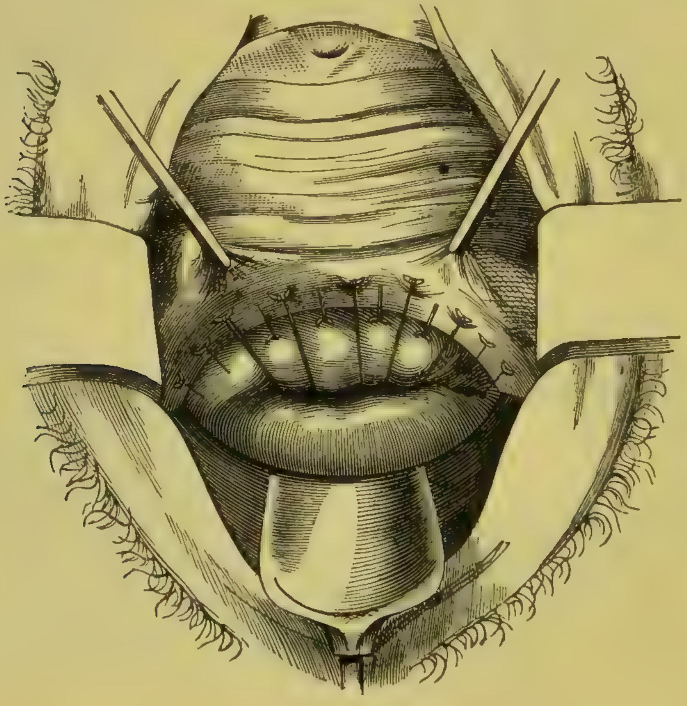


Fig. 386.

Sutures passed through anterior lip of cervix so as to close in transversely a fistula of the anterior fornix (H. and K.).

anterior lip to close the fistula; the result is a crescentic wound (fig. 386). Sometimes we have to excise a position of the cervix to get a sufficient raw surface (fig. 387). When much of the anterior lip is destroyed, it may be necessary to use the posterior lip to close the fistula

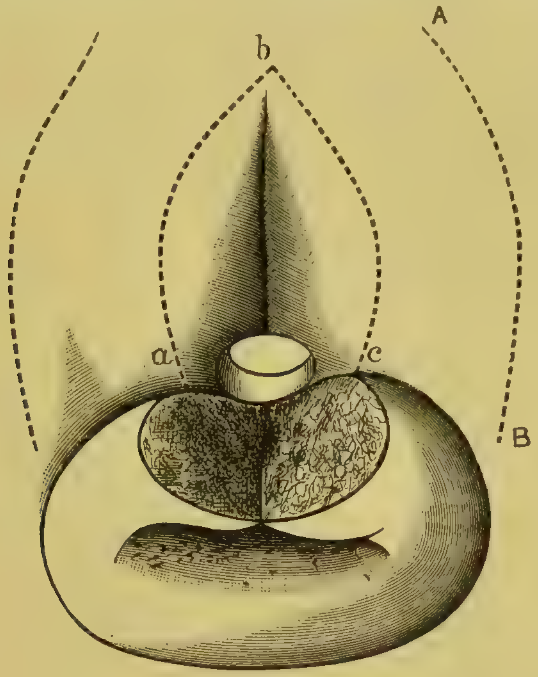


Fig. 387.

Anterior lip divided to close in vertically a fistula close to it: *a b c* shows extent of surface, round the oval fistulous opening, to be made raw; the mucous membrane may have to be incised outside the sutures, along the line *A B*, to relieve tension (Emmet).

(see fig. 359, and compare it with fig. 358); in this case the uterus will communicate with the bladder and the menstrual blood be discharged per urethram. With vesico-uterine fistula, two courses are open. If possible, we expose the fistula by splitting the cervix bilaterally and treat it as vesico-vaginal fistula: when this cannot be done, we pare the edges of the os and stitch up the cervical canal; we thus make the uterus open into the bladder (fig. 388).

When there is a *urethral* as well as a vesical fistula, the *former must be closed first*: when there is *atresia* of the urethra, the free margins of the urethral wall above and below are pared and united by sutures so as to bridge over the atresic portion (fig. 389); the vesical fistula is obliterated by a second operation.

3. *After-treatment.* A stationary catheter is placed in the bladder. The form in fig. 390 is the one generally used, the urine being made to drip into a long narrow vessel (as a soap-dish) passed between the patient's thighs; two catheters are required, so that they may be changed every day as the salts of the urine readily occlude the tube; the one not in use should be thoroughly washed.

The after-dangers of the operations are hæmorrhage into the bladder and vesical catarrh. The former is a troublesome complication, as the blood-clots collect in the bladder; when there is marked hæmorrhage distending the bladder, the fistula must be opened up again. Sometimes

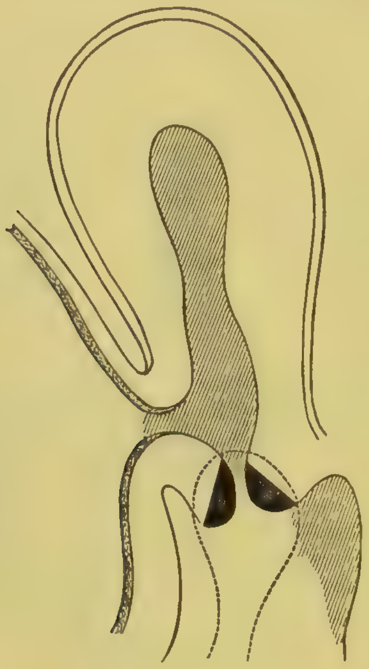


Fig. 388.

Vesico-uterine fistula. The lips of the cervix are pared, preparatory to stitching up the cervical canal (H. and K.).

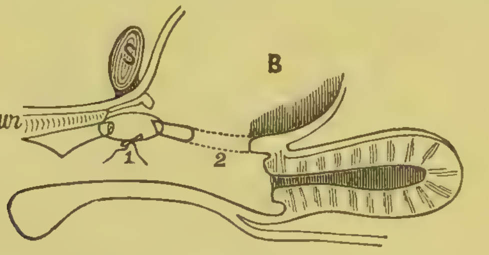


Fig. 389.

Vesical fistula + Atresia of a portion of the urethra *ur* just below the symphysis *s*. The latter is first bridged over at 1 and then the vesical fistula closed in at 2 (Winckel).

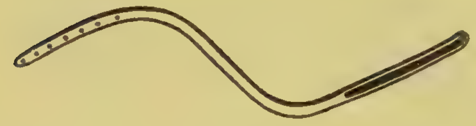


Fig. 390.

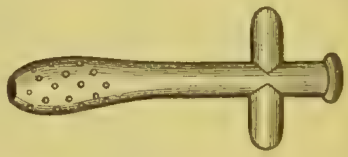


Fig. 391.

Sims' stationary catheter: fig. 390, first model; fig. 391, newest model. That in fig. 390 is made of block tin so that it can be bent to any curve; when *in situ*, it must be bent so that the external end has its groove uppermost: that in fig. 391 is of rubber and has tubing attached to it.

the ureter has been caught in a stitch and compressed; intense pain, shooting from the kidney downwards along the course of the ureter, with vomiting and other symptoms of uræmia followed but passed off on relaxing the sutures.

The sutures are removed on the 10th day; if the fistula has not united, they may be left till the 14th day. The method of removing sutures is shown at figs. 383 and 392.

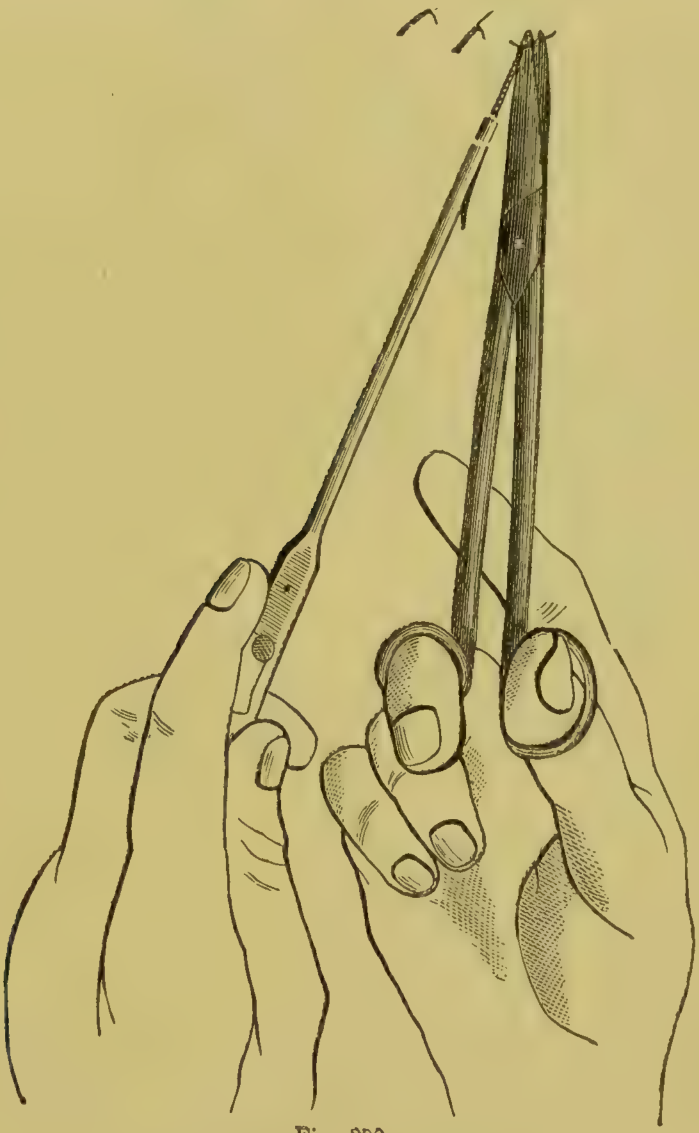


Fig. 392.
Method of removal of sutures (after Sims).

Obliteration of Fistulæ by Cauterisation.

This treatment is only applicable to very small fistulæ. Cauterisation may be done with nitrate of silver or the red-hot wire. Where the fistula is of any size, cauterisation not only fails to close it but converts its margins into cicatricial tissue; this makes its subsequent closure with sutures more difficult. This method of treatment, even in the case of larger fistulæ, has been recently revived and advocated by Bouqué,* whose writings may be consulted.

Closure of the Vagina: Kolpokleisis.

Where direct closure of the fistula is impossible, the only means for relieving the patient's discomfort is closure of the vagina below the fistulous opening. The portion of the vagina above this becomes, as it were, an extension of the bladder; the menstrual blood is discharged with the urine.

Vidal de Cassis, who originated this operation, performed it as follows. The inner surfaces of the labia majora were pared and brought together by sutures: the vagina was thus closed in an *antero-posterior* direction. After this operation, there always remained just below the urethral orifice a small cleft through which the urine trickled. Unless complete continence is obtained, such an operation is useless.

Kolpokleisis is the name given to the operation introduced by Simon. It consists in obliteration of the vagina *transversely* by making a raw surface on its walls above the level of the ostium vaginæ. It is evident that this operation is justifiable only where closure of a fistula is impossible, either through the binding down of its margins to the bone with cicatricial tissue or through the complete destruction of the urethra. As the closure of the vagina interferes with married life, the nature of the operation should be explained to the patient beforehand and full permission obtained.

The operation is performed as follows. By pinching up the mucous membrane ascertain where it is most lax, so that the vaginal walls can be easily approximated; the point of closure should be as high up as possible. Mark out with the knife the ring of tissue to be excised. Lay hold of its lower margin and dissect it from below upwards; with the finger in the rectum and the sound in the urethra, we can judge of the thickness of tissue to be removed (compare fig. 393 with fig. 394). On each ligature of wire or carbolised silk, two small curved needles are threaded so that *both* ends of the thread may be passed *from above downwards.* The needle must be entered into the vaginal mucous membrane above, carried through the substance of the vaginal wall (without appearing in the wound) and brought out through the vaginal mucous membrane below; it is difficult to prevent these sutures from catching up either bladder or rectum but this should, if possible, be avoided. Care is required in the introduction of the first mesial suture as it is the guide for the others.

---

* Du traitement des fistules uro-gén., par la réunion secondaire : Paris, 1875.

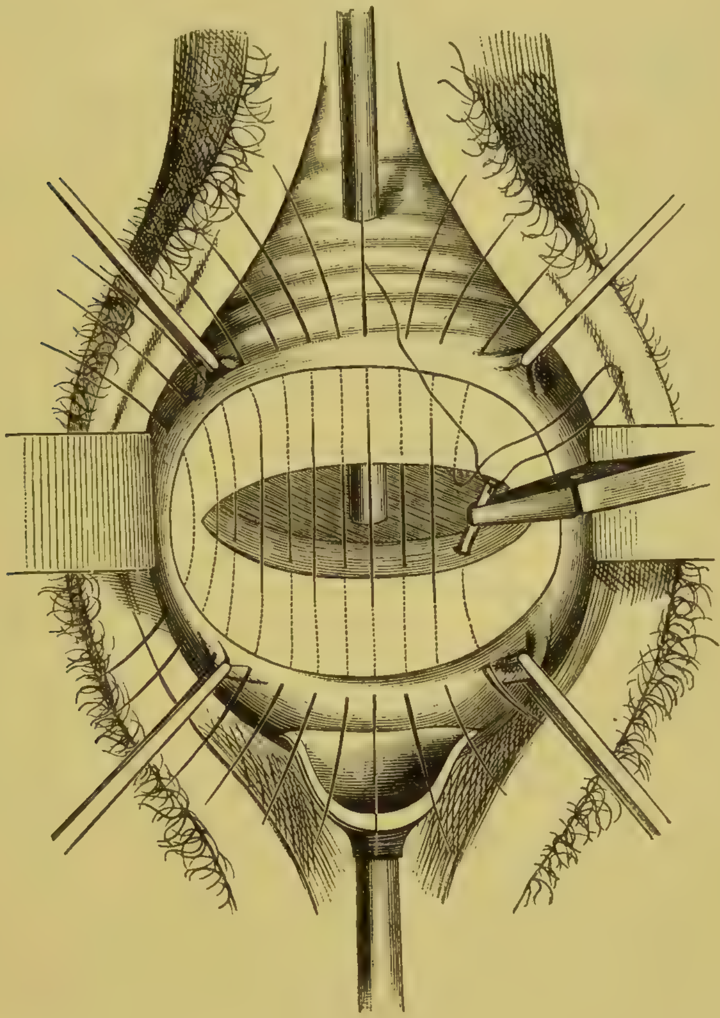


Fig. 393.

Simon's Operation for Kolpokleisis. The patient is in the lithotomy posture; the sound has been passed through urethra and fistula, and is seen in the upper portion of the vagina; the perineum is drawn back with the speculum and the labia majora with spatulæ. A band-like piece of tissue has been removed from both the vaginal walls above the ostium; the raw surface is left unshaded in the figure. The vaginal mucous membrane is held tense by four pair of forceps outside the raw surface, the shaded area within the latter is the upper third of the vagina. An end of the last suture has been passed through one raw surface, the second end is being carried through the other raw surface (H. and K.).

The results of this method are satisfactory as regards the production of complete continence. There is no liability to stagnation of urine or formation of concretions (Hegar and Kaltenbach). Hæmatometra will not occur unless there has been atresia of the cervix uteri. If menstruation has been in abeyance, it will probably return after the operation; in a case operated on by A. R. Simpson, the patient had not

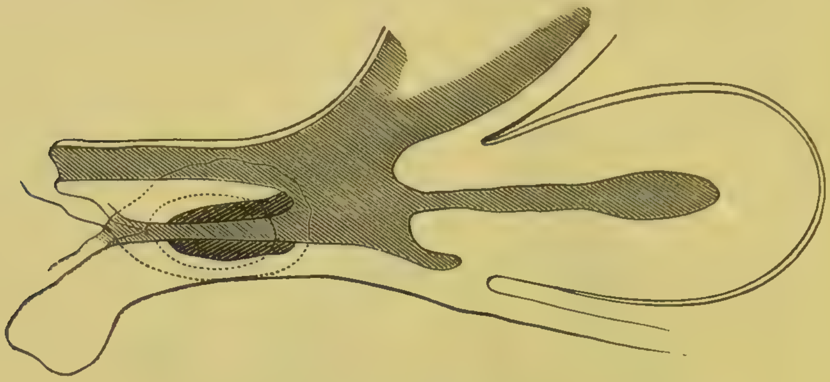


Fig. 394.

Same operation as seen in section to show relation of raw surfaces (shaded dark), position of sutures and common receptacle above for urine and menstrual blood. The bladder and urethra are in upper part of figure (H. and K.).

menstruated for a year, but a few weeks after the operation the menstrual blood appeared in the urine.

CHAPTER LIV.

THE RECTUM: COCCYGODYNIA.

LITERATURE.

Allingham—Diseases of the Rectum : Churchill, 1871. *Chadwick*—On the Functions of the Anal Sphincters : Am. Gyn. Trans., 1877. *Cripps*—Cancer of the Rectum : Churchill. *Hart*—Physics of the Rectum and Bladder : Edin. Obst. Trans., 1882. *Ruedinger*—Topographisch-chirurgische Anatomie des Menschen, vierte Abtheilung. *Storer*—The Rectum in its relation to Uterine Disease : Am. Jour. of Obst., Vol. I., p. 66. *Syme*—Diseases of the Rectum : Edin., 1859. *Van Buren*—Diseases of the Rectum : H. K. Lewis, 1881.

Not only is the gynecologist frequently consulted about rectal mischief, but as a matter of fact female patients sometimes refer rectal disease to the uterus or vagina ; therefore, in investigating gynecological cases, one has occasionally to satisfy himself that the rectum is not the seat of the affection.

Vaginismus may be caused by fissure of the anus, as we have already seen, and pruritus vulvæ by ascarides from the rectum passing into the vagina.

PHYSIOLOGY OF THE RECTUM.

The anatomy of the rectum has been already considered (p. 34). The relations of the axes of rectum, anus, vagina and urethra, to one another and to intra-abdominal pressure are of importance. As we have already seen, the vagina and urethra are parallel to one another and to the plane of the brim.

Strictly speaking the surface whose outer boundary is the brim of the bony pelvis is not a plane surface, inasmuch as the various points in the outline of the brim are not on the same level. The vagina is thus, properly speaking, parallel to the internal conjugate of the brim.

The rectum runs, in its lower 1½-inch, close behind the vagina and parallel to it; the anal canal turns directly backwards so as to cut the vaginal axis at right angles. Intra-abdominal pressure acts at right angles to the vaginal walls, as can be noted from the fact that in defæcation the Hodge pessary is not driven out of the vagina. Consideration of fig. 395 will show that the direction of intra-abdominal pressure on the pelvic floor coincides with the long axis of the anus, so that intra-abdominal pressure will act with its full driving force on any body in the anal canal.

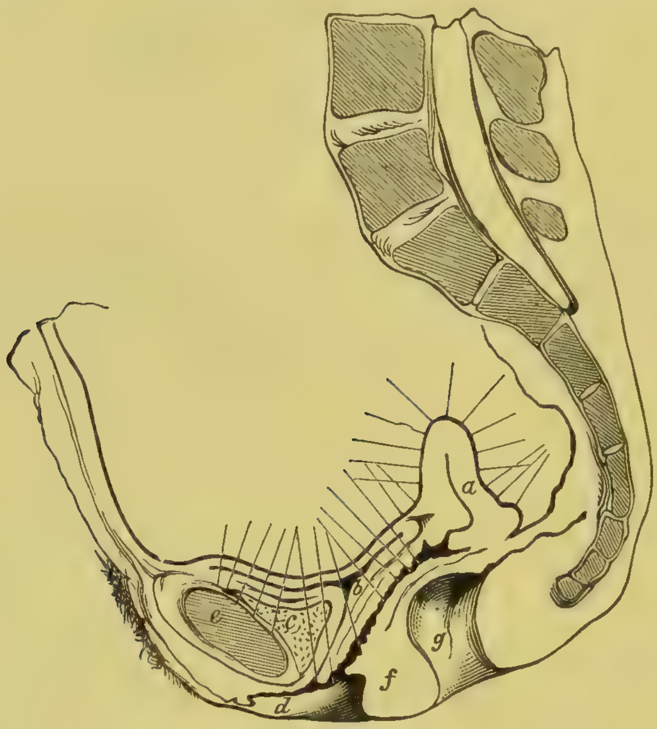


Fig. 395.

To show direction of rectum and of anus in relation to intra-abdominal pressure. For letters see fig. 63 (Hart).

The mechanism of defæcation, is probably the following. According to Hilton, in his now classical book on "Rest and Pain," the lower part of the rectum is sensitive but the upper two-thirds are but slightly so; the rest of the large intestine and the small intestine are non-sensitive. Hilton limits the sensitive portion to the lowest two inches of the rectum—to the part below the so-called sphincter tertius. When there is accumulation of fæcal matter in this portion, pain and uneasiness produce the desire to expel these contents. There result the following reflex movements :—

(1) Relaxation of the sphincter ani;

(2) Peristaltic contraction of the circular unstriped muscle;

(3) Shortening of the longitudinal muscle with eversion of the mucous membrane. Since the longitudinal fibres have a fixed point below, their contraction will probably pull the rectum more into the line of the anal axis;

(4) Contraction of the segments of the sphincter tertius.

In this way the lowest portion of the rectum becomes roofed in above by the sphincter tertius and open below. Intra-abdominal pressure drives this portion downwards; and the rectal contents, elongated by peristalsis and depressed by intra-abdominal pressure and eversion of the mucous membrane, are finally brought into the relaxed anal canal from which intra-abdominal pressure readily expels them. Ruedinger's diagram (fig. 37) shows well how the Levator ani will reinvert the everted mucous membrane.

Inattention to the proper evacuation of the bowels leads to non-sensitiveness of the mucous membrane and is thus one factor in constipation.

EXAMINATION OF THE RECTUM.

This may be done in three ways;

(*a*) By finger (*v.* p. 98),

(*b*) By speculum,

(*c*) By eversion of the anterior rectal wall through digital pressure in the vagina (Storer).

By speculum. The anal speculum has usually an oval fenestra; it is passed into the anus in the direction of its long axis, and rotated so that each portion of the anal lining comes opposite the aperture (fig. 397).

Storer's method is as follows. Place the patient on her side; pass two fingers (or one) half way into the vagina, with the pulps of the fingers on the posterior vaginal wall. Then press these downwards and backwards, and thus evert the rectal mucous membrane through the dilatable sphincter ani which is at the same time pressed open with the fingers of the other hand. This method is most easily employed in multiparæ.

DISEASES OF THE RECTUM.

Women are especially liable to rectal disease owing to the distention of parts accompanying parturition, as well as from their habitual neglect of the regular evacuation of the bowels. As rectal diseases often simulate those of the vagina, a sketch of the more important of them is necessary in a manual of gynecology. We shall therefore consider the following affections:—

Displacements of the rectum,
Fissure of the anus,
Piles,
Recto-vaginal fistula;
Functional disturbance of Rectum—Constipation.

Displacements of the Rectum.

These are—Rectocele;
Prolapsus Recti (*a*) of mucous membrane,
(*b*) of whole thickness of bowel.

For *Prolapsus Recti*, which is properly surgical, see Van Buren or Allingham.

Rectocele is a protrusion of the lower part of the anterior wall of the rectum covered by the posterior vaginal wall, into the lumen of the vagina or even through the vaginal orifice. *Etiology*. There are two factors—tear of perineal body and pressure of scybala in rectum. *Diagnosis*. The posterior vaginal wall is seen protruding into the vagina or out at the vaginal orifice. The diagnosis is made by noting the relations of the protruded vaginal wall and by passing the finger through the anus into the pouch (fig. 396). *Treatment*. The patient should wear in the vagina a Hodge or Albert Smith pessary with cross bars; explain the necessity of a regular daily evacuation of the bowels.

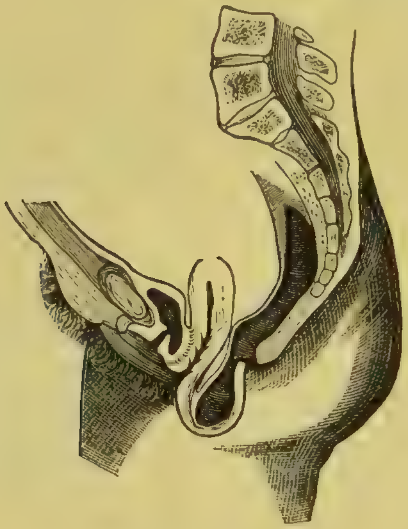


Fig. 396.
Rectocele (Schrœder).

Fissure of the Anus.

This is a crack, or ulceration, of the anal skin or of the mucous membrane covering the internal sphincter. In the edges of the crack there is usually a nerve filament, and below the crack lies the powerful sphincter ani.

This apparently insignificant lesion gives rise in most cases to an unbearable and even incredible amount of pain, lasting for hours after the bowels have moved. Hilton's explanation of this is so good that we give it entire.

"The reason for this anal ulcer being so very painful is the number of nerves associated with it; and the cause of the continued painful contraction which accompanies it lies in the enduring strength of the sphincter muscle. Thus it happens that exposure of those nervous sensory filaments upon the ulcer causes excito-motory or involuntary and spasmodic contraction of the sphincter, through the medium of the spinal marrow. The sphincter muscle contracts towards its own centre, and, as long as the muscle is in a state of contraction, it brings the sen-

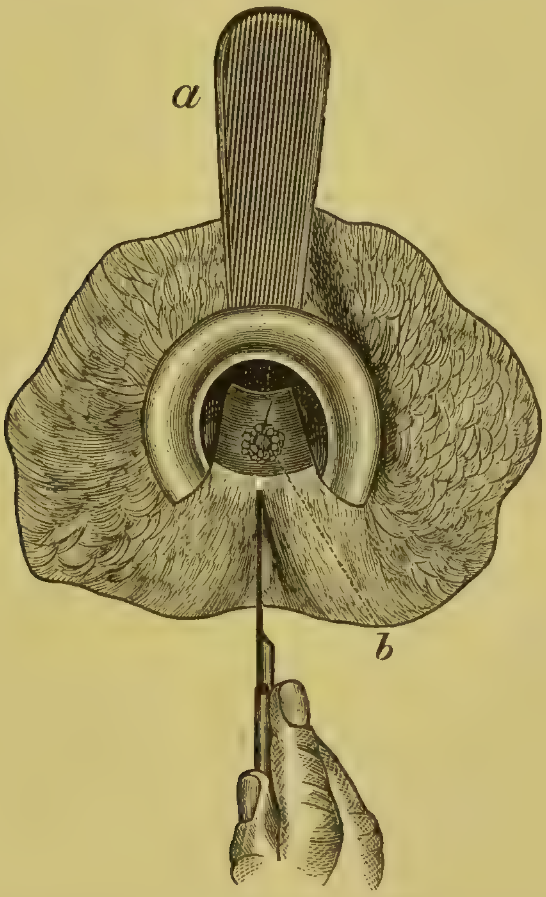


Fig. 397.
Anus with *a* anal speculum *in situ*; it is turned so as to expose in the fenestra a fissure *b* beneath which a tenotomy knife has been passed (Hilton).

sitive edges of the ulcer into forced contact; this excites more muscular contraction, and thus, by time and exercise, the muscle becomes hypertrophied, massive, and increased in dimensions."

Symptoms. The patient complains not so much of pain while the bowels are being moved as *of an unbearable pain coming on after the evacuation and continuing for some hours.* The pain is described as unendurable, causing the patient to dread and postpone natural motions. There are often iliac pains and vaginismus; this last symptom is not infrequent.

Physical signs. By speculum or eversion, the crack is seen.

Treatment. Chloroform the patient, pass a tenotomy knife beneath the base of the ulcer (fig. 397) and cut upwards. This divides the muscular fibre so that the irritated edges can no longer be brought together. The fissure gets rest and heals readily; a cure is thus effected.

Another and very good plan is to chloroform the patient, and introducing the thumbs (with the dorsal surfaces in contact) to stretch the anus by forcibly separating them; this ruptures the muscular fibre and acts just as the knife does, and is especially good when the fissures are multiple.

The bowels are not to be moved for a day or two; the patient has then some pain when the motion is passing, but none after it.

Piles.

Hilton has pointed out that at the anus the line of demarcation between skin and mucous membrane is marked out distinctly by 'the white line,' as he terms it. This line is of great practical importance, as we shall see.

Piles are small tumours at the anus, on either side of this white line. They consist of dilated veins embedded in connective tissue and covered by skin or mucous membrane. We speak of external piles, *i.e.* those outside of the white line and covered by skin, and internal piles, *i.e.* those inside of the white line and covered by mucous membrane. Occasionally we have, as a special form of external pile, a dilated vein outside of the white line and usually containing a clot (venous pile).

Symptoms. Venous piles cause great pain; while external piles, unless inflamed, occasion little inconvenience; from internal piles, there is bleeding when the bowels are moved.

Physical signs. The venous pile is a purplish tumour outside of the white line; external piles are like tags of skin, or are more or less distended; internal piles are cherry-red and easily bleed.

Treatment. 1. When venous piles contain a clot, incise and turn out clot.

2. For internal piles, employ the following *palliative* treatment. Give sulphur confection when necessary.

℞ Confectionis Sulphuris ℥ij.
Sig. Dessertspoonful at night.

Order gall and opium ointment to be applied.

℞ Unguenti Gallæ c̄ Opio ℥ij.
Sig. As directed.

For any abrasions, order iodoform ointment (p. 495) or Bismuth suppositories.

The *radical* operative treatment belongs more to the surgeon.

Recto-vaginal Fistula.

The situation of such a fistula is shown in fig. 357. It may be due to carcinomatous or syphilitic ulceration, or to injury received during parturition. The last is alone amenable to operative treatment, which is the same as for a vesico-vaginal fistula

Functional disturbance of Rectum—Constipation.

Women are usually exceedingly careless in the matter of regulation of the bowels; very often, evacuation is practised once a week or even at longer intervals. This is in many respects not their fault but is due to the insufficient water-closet accommodation, to modesty, and to the fact that evacuation is for evident reasons postponed during menstruation.

When consulted for constipation, the medical man should insist on the value of a daily evacuation at a fixed hour; this educates the bowels to demand it regularly. All quack pills should be tabooed as dangerous. The diet should be regulated; bran-bread, porridge and milk, stewed fruit, figs, etc., taken as part of food. The following pill is good.

℞ Extracti Nucis Vomicæ
Extracti Belladonnæ āā gr. ¼
Pilulæ Colocynthidis et Hyoscyami „ iij.
Fiat pilula: mitte tales vj.
Sig. One occasionally.

The nux vomica and belladonna strengthen the peristalsis of the bowel: the colocynth and hyoscyamus pill is purgative; aloes and iron pill may be substituted for it.

The purgative mineral waters are very useful. The best are the Friedrichshall, Hunyadi Janos and Aesculap. The patient should take in the morning a wineglassful or half-tumblerful with an equal amount of hot water; the taste may be masked by the juice of a lemon with sugar. The Carlsbad salts are good and may be used as already directed (p. 308). Very often an enema of cold water is helpful. The medical man should deprecate the habitual use of purgatives, and insist on natural and daily evacuation.

The aloes and iron pill is good in sluggishness of the lower bowel. Rhubarb is bad as a habitual purgative, owing to its tendency to constipate after purging; the well-known 'Gregory's Mixture' should not be used as a habitual purgative, but is good in diarrhœa inasmuch as it first purges and then binds. Fluid magnesia, castor oil, and some of the milder salines (*e.g.* the easily-taken Seidlitz powder) may be employed. Blue pill should be avoided; Euonymium or Iridin are better hepatic stimulants (*v.* p. 537).

COCCYGODYNIA.

LITERATURE.—*Hildebrandt*—Die Krankheiten der äusseren weiblichen Genitalien: Stuttgart, 1877, S. 127. *Nott*—N. O. Medical Journal, May 1844. *Simpson, Sir J. Y.*—Diseases of Women: Edinburgh, 1872, p. 202. *Thomas*—Diseases of Women: London, 1880, p. 151.

By this we understand a painful condition in the region of the coccyx induced by sitting, walking, and the various muscular contractions associated with defæcation and coitus. When we consider the anatomy of the coccyx, its muscular attachments (to the levator ani, coccygeus, external sphincter ani, and gluteal muscles), as well as the strain put on it when driven back during parturition, we are not astonished that in some cases there should be inflammatory changes around and in it causing pain in its movement.

Symptoms. The chief symptom is pain on sitting, walking, and defæcation.

Physical signs. By digital pressure on the coccyx and examination per rectum, the seat and nature of the pains are made out.

Treatment. (1) Pass a tenotomy knife beneath the skin on the posterior aspect of the back, and free its lateral and apical muscular attachments; or (2) amputate the coccyx. To do the latter, make a vertical mesial incision over the posterior aspect of the coccyx; seize its tip and pull it well back; then free its muscular attachments with the knife, keeping close to the bone; finally separate it at the sacro-coccygeal joint.

APPENDIX.

SYPHILIS.

LITERATURE.

Bäumler—Article 'Syphilis' in Ziemssen's Cyclopædia of Medicine. *Fournier*—Syphilis and Marriage, translated by A. Lingard: London, 1881. *Lanceraux*—A Treatise on Syphilis, Historical and Practical: New Sydenham Society, 1868. *Hunter, John*—A Treatise on the Venereal Disease: London, 1786. *Hutchinson, Jonathan*—Constitutional Syphilis: Reynold's System of Medicine, London, 1866, Vol. I. p. 287. *Ricord*—Lettres sur la Syphilis: Paris, 1863.

Though syphilis does not specially belong to diseases of women, it comes so frequently under the notice of the gynecologist that no apology is required for introducing it here. The compass of this work admits of but a brief summary of this very important subject; for fuller details, we refer the student to the literature quoted above.

For convenience, we shall consider it under the following heads:—

1. Phenomena of an attack of syphilis and its treatment;
2. Syphilis and marriage;
3. Syphilis and pregnancy.

PHENOMENA OF AN ATTACK OF SYPHILIS.

We have arranged in a tabular form on page 608 the leading facts, as given by Bäumler in his admirable article. Ricord's division of the progress of the disease into three periods—primary, secondary and tertiary—is the one usually adopted. Lancereaux, dividing the first into two, names four periods as follows: period of incubation, period of local eruption or of the primary lesion, period of general eruption, period of gummy products.

The succession of the various phenomena will be easily remembered if we compare them with those of an attack of one of the exanthemata, measles for example: there is *infection* by the poison; a *period of incubation*, during which the system is becoming saturated with it; the development of *fever;* the appearance of *eruptions;* finally, certain *sequelæ*—the changes of the tertiary period.

PERIOD.	DEFINITION.	DURATION.	PHENOMENA.	CLINICAL CHARACTERS.	GENERAL PATHOLOGICAL CHANGES.	RELATION TO THERAPEUTICS.
PRIMARY	from infection to appearance of general symptoms ;	nine to eleven weeks ;	appearance of the hard chancre at from the 3d *to the 4th week*, enlargement of neighbouring glands ;	flat papule, afterwards covered with a crust, which has a *hard base* and is localised at point of infection ;	dense cellular infiltration of tissues of cutis or of mucous membrane — most marked in tunica adventitia of blood-vessels, increased formation of connective tissue ;	cauterisation has very rarely checked further progress.
SECONDARY	from appearance of general symptoms to an indefinite date ;	for months or years, after which the disease exhausts itself or tertiary symptoms develope ;	skin eruptions, sore throat, mucous patches, enlargement of glands of body generally, falling-out of hair, disease of nails, iritis and retinitis, periostitis ;	affections, superficial and symmetrical, of eyes — tonsils, skin on both sides—healing without loss of tissue ;	circumscribed dilatation of blood-vessels with exudation of white and red corpuscles into their sheaths or the surrounding tissue, extravasated blood-pigment producing coppery-colour, epithelium of mucous membrane thickened (producing white patches) or ulcerated ;	benefitted by mercury.
TERTIARY	does not commence, as a rule, till some years after secondary has disappeared ;	indefinite ;	gummatous deposits in liver, lungs, bones and brain ;	new formations, deeply seated and symmetrical, tending to degenerate or healing with loss of tissue ;	the typical gumma consists of a collection of closely packed nucleated cells, which at the centre undergoes fatty degeneration and at the circumference developes a capsule of fibrous tissue — it thus closely resembles a caseating tubercular deposit ;	benefitted by iodide of potassium, mercury sometimes injurious.

In the primary period, syphilis is a *local* affection ; in the secondary, it is a general *blood-affection ;* in the tertiary, it is a general *tissue-affection.* The primary sore is the depôt in which the poison is generated and from which it is gradually served out till the whole system is permeated and the eruptions of the secondary period appear. The secondaries are transient changes in healthy tissue excited by syphilised blood ; they are therefore multiple and symmetrical. The tertiaries are permanent changes in syphilised tissues due to an external exciting cause ; they are single and asymmetrical.

The *rapidity* with which the disease passes through the three stages varies indefinitely ; in some severe cases, the changes characteristic of the tertiary period may develope in a few months. Just as when scarlet fever attacks a household some have only the sore throat while others are more seriously affected according to the constitution of each, so the *susceptibility* of individuals to the syphilitic poison varies ; its constitutional effects are most marked in scrofulous subjects and those given to alcohol.

The saturation of the system with the poison during the secondary period creates an *immunity* from it which diminishes afterwards ; the *communicability to offspring* diminishes after the second period, so that marriage becomes justifiable.

Of the *nature* of the poison, nothing is yet known. It is present in the primary sore, the condylomata and mucous patches of the secondary period, and, at a certain stage, in the whole blood of the patient. It is probably not present in normal secretions—such as milk, saliva, and urine. As we shall see afterwards, the semen of the syphilitic parent produces a syphilitic fœtus though apparently it is not directly contagious.

The *period of incubation,* that is the time which elapses between the infection and the appearance of the hard chancre, is approximately stated as from three to four weeks. Of 32 cases tabulated by Bäumler, in which its duration was definitely ascertained, 11 were from fifteen to twenty days and 12 from twenty-one to twenty-five ; the shortest was ten, the longest forty-four. After this, a second period of about six weeks elapses before the skin eruptions appear. The total duration, therefore, of the primary period is from nine to eleven weeks. In the case of hereditary syphilis, there is also an apparent period of incubation after the birth of the child ; the skin eruptions and condylomata do not appear for three weeks. Even where syphilis is to show itself in general weakness, the child is often born in perfect health but after some weeks rapidly dwines away ; it would appear that the effect of the poison is not incompatible with healthy intra-uterine life, but the child is heavily handicapped in the struggle for existence and rapidly succumbs to external influences.

The *primary sore* in the female is not often seen by the practitioner; the patient does not seek advice because it does not attract attention, or the condition is masked by the existence of soft chancres. It may be present 'as a dry or ulcerating induration upon one of the labia majora or else as a simple parchment-like thickening upon the borders of the labia minora, or in the form of several papules in process of conversion into flat condylomata' (Bäumler); when within the ostium vaginæ or on the cervix uteri, it readily escapes observation.

Hard and soft chancre. The soft chancre has the following characters:—it developes *without a period of incubation* in the course of four-and-twenty hours; it is usually multiple in the female, as it is a contagious though local infection; the neighbouring glands are much enlarged and tend to suppurate; it is *not followed by the symptoms of constitutional syphilis.* The absence of a period of incubation and of constitutional symptoms are the points which distinguish it from a hard chancre. We must not forget that the two may occur together, and that where soft chancres have been present the hard one may easily escape detection; we can thus explain the often-repeated observations that constitutional symptoms may follow a soft sore and that a soft sore, in the female, may produce a hard sore in the person infected by her.

The *fever*, which *precedes* the outbreak of the manifestations of the secondary period, is present in about one case in five; it consists of one or several distinct rises in temperature and is sometimes intermittent. When accompanied with pain in the joints, it makes the case resemble one of articular rheumatism. There is further intense pain in the head (worse at night), and pains in the 'nape of the neck, the back, the loins, the costal parietes and the large joints' (Lancereaux).

The *skin eruptions* in syphilis have the following characteristics:—they are of a *coppery-red colour* which is due to alteration in the pigment of extravasated blood, this pigmentation is most marked in patients of dark complexion or when the local skin changes have progressed slowly; they are of a *polymorphous character*, papules, vesicles and pustules being present simultaneously; they have an *annular form* due to retrogression in the centre with extension at the periphery; as a rule, there is *no itching*, and the eruption may appear without the patient's being conscious of it. The diagnosis of a specific eruption is not difficult when we have the history and other accompaniments of syphilis (loss of hair, sore throat, and enlarged glands) to guide us; the sudden development of the syphilitic roseola with accompanying fever, might be mistaken for measles, smallpox, or typhoid. When the syphilitic papule developes between folds of the skin where there is much moisture, as between the fingers and toes or at the angle of the mouth, it takes on a *condylomatous form.* We only enumerate the various forms of eruption here. Besides the roseola and papular eruption, there are a syphilitic psoriasis, lichen, acne, impetigo, ecthyma, rupia, lupus. For fuller information see Bäumler or Lancereaux.

The *loss of hair* is the result of changes in the skin but may occur independent of such changes ; the hair becomes dry and falls out, leaving the skin normal (not smooth and shining as in alopecia areata). Changes in the nails, onychia and paronychia, also occur. The enlargement of the glands of the body generally is best noted in the cervical glands.

On *mucous membranes*, we may have either superficial erosions or milk-white spots due to thickening of the epithelium. The sore throat so characteristic of syphilis appears first as a diffuse redness ; then mucous patches, which ulcerate, appear on the tonsils ; finally, the tonsils become chronically enlarged.

The changes of the tertiary period are the most serious. The dangers as to health and life will depend upon the importance of the organs affected by the gummatous deposit; when symptoms due to the formation of such deposit in the brain develope, the prognosis is very grave. According to Hutchinson and Bäumler, the changes of the tertiary period are not due to the direct action of the syphilitic poison ; but the syphilitic virus has so altered the general condition of the tissues as to render them peculiarly liable to inflammatory changes on a slight exciting cause. The severity of the tertiaries varies indefinitely and bears no relation to that of the primary or secondaries. As Ricord happily expressed it, syphilis is an uncertain creditor; sometimes allowing the syphilitic to escape with a slight penalty, at other times exacting the last pound of flesh; in all cases, health is mortgaged.

Treatment.

The primary sore, when seen, calls for no treatment. *Cauterisation* will not destroy the poison in the individual as already it has spread beyond the exact seat of the chancre—the test that the glands are not enlarged to the touch is too rough to be a proof that the poison has not extended to them ; as a means of preventing the communication of the disease, it is unnecessary—in ninety-nine per cent of the cases it is the husband who has communicated syphilis to his wife. When the primary sore is large, it should be kept clean and washed with black wash; when painful and not healing well, iodorm is very useful. The constitutional treatment by mercury should be begun as soon as the primary sore is recognised, as by this means the secondaries may be neutralised (Hutchinson).

The secondaries are treated by mercury. For condylomata, there is nothing equal to calomel.

℞	Calomelanos	℥ii.
	Sig. To be dusted on as directed.	

Mercury may be given internally in three ways—(1) by the mouth, (2) by inunction, (3) by the calomel bath.

By the mouth we give the metal in the familiar blue pill or as hydrarg. c. creta. The perchloride is given as $\frac{1}{16}$ of a grain in pill.

The red iodide is also good; it is more active when freshly prepared from the perchloride as follows.

℞	Hydrarg perchloridi	gr. i.
	Potass. iodidi	ʒi.
	Aquæ	℥ii.
	Sig. A teaspoonful thrice daily.	

For *inunction*, blue ointment is employed. Take about twenty grains of the ointment and rub it into the skin for about ten minutes. The inunction should be made methodically on different parts of the body in rotation—arms one day, chest and abdomen the next, the back the following day, and so on (*v.* Sigismund). This method is best where we wish to have the action of mercury speedily—as when important organs are becoming affected, or when the digestive system is disturbed (Bäumler).

The *calomel bath* is recommended by Lee * and is given as follows. Strip the patient, place her on a stool with a blanket over the whole person and overhanging the stool; place under the stool a tin plate with about eight grains of calomel on it; there is a trough, surrounding the calomel on the plate, containing water which is made to evaporate slowly by means of a spirit lamp; the steam from the water carries the fumes of the calomel upwards with it. The fumigation lasts twenty minutes and the patient goes at once to bed afterwards.

The mercurial treatment may be discontinued after three or four months, if the secondaries have not developed; after a year, if they are present. Fournier continues it for two years and lays great stress on his method of 'successive or intermittent treatment': mercury and iodide of potassium after a time lose their effect, a tolerance being produced; every two or three months, their use must be discontinued for a month or more so as to ensure their action.

---

* Lee—Syphilis: Holme's System of Surgery, London, 1870.

The patient must be warmly clad, wearing flannel next the skin, and be confined to the house and even to bed if the eruptions are severe or the weather cold; for wealthier patients, a winter's residence in the south of France is beneficial. While mercury is being taken, the mouth must be rinsed thrice daily with warm water containing an aromatic and the teeth carefully brushed night and morning; this diminishes the liability to stomatitis.

During the tertiary period, iodide of potassium is given in doses of five grains, increased to ten, thrice daily.

SYPHILIS AND MARRIAGE.

It is fortunately a very rare occurrence in this country for the gynecologist to be consulted as to marriage by women who have syphilis, but the interests of his patients come under his notice indirectly when advice is sought by a man who has had syphilis but is intending to marry. Under what circumstances is marriage justifiable? This question can only be answered after a thoughtful recognition of all the interests which will be involved, and a thorough examination of the patient who asks advice. We have to consider the interests of a wife, of children, of the father of a household. We must remember that a wife may become infected indirectly through the fœtus, as well as directly through contact with the manifestations of the secondary period; that syphilitic children are the blight of married life; that the changes of the tertiary period sometimes, though rarely, produce permanent incapacity for work and even fatal results. For a full description of these dangers, we refer the student to Fournier's work on Syphilis and Marriage. The examination of the patient should determine the following points: the date of his contracting the disease; the severity, duration, and recurrence of the local eruptions; the treatment adopted; the present existence of abrasions on the penis, the lips, or other parts, as possible foci of contagion.

Fournier lays down the following conditions of admissibility to marriage: (1) Absence of actual specific symptoms at the time of marriage—these symptoms being both a possible source of infection and a key to the progress of the disease; (2) Advanced age of diathesis, the more recent the syphilis the more numerous and greater are the dangers imported into marriage; (3) Period of immunity sufficiently long since last manifestations—three or four years a minimum; (4)

Non-menacing character of the diathesis, as shown by the absence of tendency to relapses and the avoidance of important organs; (5) Sufficient specific treatment.

Of these 2 and 5 are the most important; or as Fournier graphically expresses it—'Time, on the one part, and the treatment on the other; here you see the two great major conditions to exact of all syphilitic patients before opening to them the marriage-gates.'

SYPHILIS AND PREGNANCY.

This subject is important, not only because syphilis takes on a more rapid development in the patient herself during this period but also because we have to consider the effects on the fœtus. There are three ways in which syphilis complicates pregnancy.

1. Conception occurs in a patient already syphilitic: the ovum is syphilitic, the spermatozoa may or may not be so.
2. Conception occurs in a healthy patient who becomes *directly* infected at the act of insemination or at some subsequent period during pregnancy.
3. Conception occurs in a healthy patient: syphilitic spermatozoa impregnate a healthy ovum; the mother is not infected directly with the poison but *through the syphilitic fœtus.*

With regard to the first condition, we note that the syphilitic poison wears itself out after a series of pregnancies especially when proper treatment has been adopted; thus a syphilitic patient may have first a series of abortions, then a premature still-born child, and finally give birth to a living child at full time. With regard to the second, when the mother is infected at the same time as the ovum is impregnated, the usual symptoms of syphilis develope at the tenth week of gestation; the fœtus is, of course, syphilitic. In the third form the spermatozoa are the carriers of the infection, the fœtus is the *primary sore*—the depot in which the poison is generated, and from which it is served out through the system of the mother; syphilis thus developes without any local source of contagion in the husband or primary sore in the wife. This form is therefore known as 'syphilis by conception' (Fournier), or 'syphilis by fœtal-blood-contamination' (Hutchinson). When syphilis is acquired in this way, the mother rarely has the full course of secondary phenomena. Usually these are obscure and develope gradually, loss of hair and general weakness being the only manifestations. Sometimes there is no evidence of syphilis at all—Hutchinson mentions a case in which the mother gave birth to eleven syphilitic children, and yet showed no manifestation of syphilis. Just as in vaccination the child really passes through an attack of smallpox, the only manifestation being the local pustule ; so the mother has passed through an attack of syphilis, the only manifestation being the syphilitic child.

Thus Hutchinson explains the fact, first recorded by Colles, that a healthy woman may nurse her syphilitic child without being infected by it; while the same child, given to a healthy nurse, would produce a chancre on her breast and all the phenomena of an attack of syphilis. A woman who has just given birth to a syphilitic child acquires therefore the same immunity as regards a second attack as one who has had an attack of syphilis.

The clue to the existence of syphilis is often given by pregnancy. Thus a series of abortions (without any other cause to explain them) creates a suspicion of syphilis. Repeated occurrence of death of the fœtus in utero, at the seventh or eighth month, is probably due to this cause ; this is confirmed by our finding, on splitting up the ends of the long bones, the 'speckled discolouration and softening of the spongy tissue of the bone in the neighbourhood of the epiphyses' described by Wegner as pathognomonic of syphilis.* If the infant has "snuffles" (due to catarrh of the nasal mucous membrane), skin eruptions and condylomata, the diagnosis of syphilis in the parent is certain.

We should always examine the grown-up children for traces of hereditary syphilis. These are usually found in the eye and teeth. In the *eye* there occurs at the second dentition, and at puberty in girls, an *interstitial keratitis* ;† the opacity, beginning at the circumference, extends to the centre and disappears in the same order, lasting for a period of from five to twelve months. The changes in *the teeth* have been fully described by Hutchinson.‡ The teeth stand apart with interspaces between, and are rounded or peggy in form instead of flat ; they usually exhibit in their border a broad shallow notch, or two or three serrations ; owing to their softness they rapidly wear away, and from the deficiency of enamel have a dirty greyish colour. The teeth thus affected are the incisors and canines of the permanent set, especially the *upper incisors* (fig. 398). The change in form is due to syphilitic stomatitis during the first weeks of life which affects the development; if a syphilitic patient escapes stomatitis, the teeth will not be affected.

---

* Virchow's Archiv., B. 50, S. 304.

† Hutchinson, Jon.—Memoir of certain diseases of the eye, &c., London, 1863.

‡ Trans. Path. Soc. London, Vol. IX. p. 449 : Report on the effects of Infantile Syphilis in marring the Development of the Teeth. Ibid., Vol. X., p. 287 : Report on Malformations of the Teeth as indicative of Diathesis ; illustrated by coloured plates.

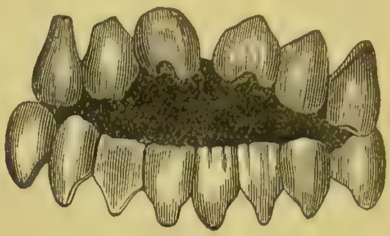


Fig. 398.

Teeth from a case of hereditary syphilis, the upper central incisors are dwarfed and have a broad vertical notch in their edge (Hutchinson).

The benefits of a mercurial treatment are distinctly brought out in syphilis and pregnancy. Under efficient treatment the duration of pregnancy becomes longer, and finally a full-time healthy child is born. Mercury seems to neutralise the syphilitic virus in the blood, even though the syphilis be not cured; Fournier mentions a case where a patient gave birth to syphilitic children, then under the influence of mercury had healthy children, and discontinuing it had again a syphilitic child.

CHLOROSIS.

LITERATURE. *Balfour, G. W.*—Clinical Lectures on Diseases of the Heart: Churchill, 1882. *Fothergill, T. M.*—Practitioner's Handbook of Treatment: Macmillan & Co. *Gibson*—The Cephalic Murmur of Anæmia: Brit. Med. Journ., Jan. 1882. *Immerman*—Articles on Chlorosis and Anæmia: Ziemssen's Cyclopædia. *Niemeyer*—Text-Book of Practical Medicine (Humphrey's & Hackley's Tr.): H. K. Lewis, Lond. 1880. Immerman's articles are very exhaustive and give the literature fully. Niemeyer is also good.

Chlorosis in a mild form is an exceedingly common affection among young women; although belonging properly to the province of the physician, it comes more frequently before the gynecologist owing to the menstrual irregularities which frequently accompany it.

NATURE AND PATHOLOGY.

Chlorosis is a blood-disease characterized by deficiency in the red blood-corpuscles, and occurring in young women who have primarily a hypoplasia of the arterial system. Virchow holds that in cases of severe chlorosis we have an abnormally small lumen of the aorta, which may be so narrow as barely to admit the little finger instead of the thumb as it should do; and that, associated with this, we have abnormal arterial branches and some changes in the arterial coats. It would explain many clinical facts in chlorotic cases if it were found that the blood glands shared in this hypoplasia, but this has not yet been established. The blood itself, in ordinary and curable cases, is not deficient in its nutrient constituents which are in excess. The defect is in the red blood-corpuscles and, more especially, in the amount of hæmoglobin they contain; the proportion of iron in the blood is diminished. Chlorosis is therefore a blood disease where, from developmental defects, slight or excessive, the hæmoglobin becomes deficient. What starts this 'oligochrosis' it is difficult to say. Chlorosis is common in hard-worked servants and overtasked school girls. It has no relation to sexual excitement; the generative organs may be infantile or over developed.

SYMPTOMS AND PHYSICAL SIGNS.

The symptoms are inability to fulfil ordinary duties, and breathlessness on exertion—especially on going up stairs. There is indigestion, with marked constipation and anæmic headaches. There may also be neuralgia, and there is sometimes a nervous cough. Amenorrhœa is usually present, but is often preceded by menorrhagia. The physical signs are as follows:—

(*a*) *Appearance.* The patient is markedly pale, even greenish or yellowish in tint. The lips are bloodless, and the palpebral conjunctiva white. The patients are usually plump; there is never emaciation in uncomplicated chlorosis. Often the feet and ankles swell at night.

(*b*) *Auscultatory phenomena.* There is almost always a loud venous hum at the root of the neck on the right side, a systolic murmur outside the pulmonary area and one at the apex.

Careful examination of the lungs, liver, and spleen, reveals nothing abnormal.

The symptoms already given are easily explained. The breathlessness is of course due to the deficiency in hæmoglobin—the oxygen-carrier. The plumpness is explained by deficient oxidation of fats and by the hyperalbuminosis already noted. The venous hum and murmurs have their exact nature disputed. It should be noted, however, that the cardiac murmurs are not due to organic heart-disease.

DIAGNOSIS.

A consideration of the symptoms and physical signs we have given will render the diagnosis easy. The lungs should however, in all cases, be carefully examined; and it should not be forgotten that pregnancy may occur while chlorosis is running its course.

PROGNOSIS.

This is good unless in severe and recurrent cases where the arterial hypoplasia is marked.

TREATMENT.

There is no better remedy for chlorosis than Blaud's pills. These contain sulphate of iron and carbonate of potash made up as undernoted; as the result of the combination, the carbonate of iron is formed.

℞	Ferri sulphatis	
	Potassæ carbonatis	āā gr. iiss.
	Mucilaginis tragacanthæ	q.s.
	Fiat pilula: mitte tales 96.	
	Sig. Three, thrice daily.	

Nine pills must be taken per diem continuously for 6 to 8 weeks, by which time a complete cure usually results.

No course of treatment is so valuable and brings so much "kudos" to the physician. Before the pills are given, the state of the tongue and bowels should be looked to. If the tongue is foul and the bowels constipated, we may give the following.

℞	Magnesiæ sulphatis	℥i.
	Quiniæ sulphatis	gr. xxiv.
	Acidi sulphurici dil.	ʒiij.
	Tincturæ capsici	ʒj.
	Aquam ad	℥vi.
	Sig. Tablespoonful twice or thrice daily.	

This is taken for a week. The Carlsbad salts or Friedrichshall water may be substituted. This hint as to the preliminary purgation is a good one, and is given by Milner Fothergill; if not attended to, the result will be disappointing as the iron will not be so readily absorbed by the intestinal mucous membranes.

Many recommend change of air and diet, with stimulants; these are no doubt beneficial to the general health, but the only actual remedy is the administration of iron after preliminary purgation.

When there is menorrhagia, it must be treated (*v.* p. 537). The amenorrhœa needs only the iron unless there is developmental defect, and then nothing does good. Excessive white discharge may be treated in the unmarried by cold hip baths, and an occasional aloes and iron pill. We have discussed chlorosis so far in order to warn the student to beware of attaching importance to the mere gynecological symptoms which present themselves, to the neglect of the general condition of which they form a less important part.

Note. The original composition of Blaud's pills is as follows :—Sulphate of iron, carbonate of potash, of each half-an-ounce ; marshmallow root thirty grains ; gum tragacanth q.s. to make 120 pills.

The following are the proportions in the pill as made by Messrs Duncan Flockhart & Co. of this city : Ferri sulph. siccat. 15, Potass. carb. siccat. 15, Pulv. gum. acaciæ 3, Syrup. simp. 9 ; Divide in 5-gr. pil.

Blaud's pill gives a ferrous carbonate and a potash salt, the decomposition taking place after the pill is swallowed.

In Vallet's pill, which is popular on the continent, the decomposition is effected first and the carbonate of iron thus freshly formed is used to make the pill. The quantities taken to make Vallet's pill are as follows :—Protosulphate of iron (in crystals) 10, Carbonate of soda (in crystals) 12, White honey 3, Sugar of milk 3 ; divide in 5-gr. pil.

ETIOLOGY OF UTERINE DISEASE.

LITERATURE. *Bennet, J. Henry*—A Practical Treatise on Inflammation of the Uterus and its Appendages : London, 1849. *Emmet*—The Principles and Practice of Gynecology : J. & A. Churchill, London, 1880. *Hewitt, Graily*—The Mechanical System of Uterine Pathology : London, Longman, Green & Co. *Jacobi*—The Question of Rest for Women during Menstruation : London, 1878. *Simpson, Sir J. Y.*—Collected Works : Edinburgh, A. & C. Black, 1872. *Thomas, T. G.*—A Practical Treatise on the Diseases of Women : London, Henry Kimpton, 1880.

Diseases of the uterus and its appendages are the same essentially as diseases elsewhere—the uterus has no pathology special to it, more than the stomach or brain. The attempts made (by Bennet, Emmet, Hewitt and others) to found a system of uterine pathology, in which some special lesion (whether an inflamed cervix or an anteflexed uterus) was to play the leading part in disease and to be not only an important lesion itself but the parent of most other pelvic diseases, have been unsuccessful. Those interested in this subject may consult the literature we have given.

Diseases of women are, however, modified by certain anatomical points and functions connected with the pelvic organs ; the modifications in the pelvic floor for parturition ; the functions of menstruation, sexual intercourse, pregnancy and parturition. It would be of the greatest interest to trace the influence of these functions, when abnormal, in causing disease as well as in helping to perpetuate it ; but our space is too limited for this. One familiar instance will render our meaning clear. The student's ordinary dissection-wound of the finger soon makes him aware of the lymphatic and glandular anatomy of his arm ; the axillary glands become swollen and tender, and he is feverish and out of sorts for some days. Soon, however, all this passes off and he becomes quite well. Let us take now such a case as curetting the uterus for endometritis. In some instances, the patient becomes feverish after the operation from absorption of septic matter by the cut surface; a moderate cellulitis in the utero-sacral ligaments results. This diminishes in intensity, but becomes aggravated at the next menstrual period from the increased pelvic congestion. This continues time after time and ultimately dysmenorrhœa developes. Why and how? The cellulitis has affected the utero-sacral ligaments and their cicatrisation has produced pathological anteflexion. The inflammation resulting on the one hand in the student's finger and on the other in the patient's endometrium is precisely the same—the result of septic absorption by the lymphatics. The difference is due, in the case of the latter, to the fact that the inflammation has occurred in a region with a peculiar anatomical structure and with certain functions which modify and perpetuate the lesion.

We might multiply instances illustrating this point but the above one will show our meaning.

The function of menstruation, when disturbed, causes hæmatocele, dysmenorrhœa and other allied affections. Parturition causes laceration of the cervix, subjecting the patient to the risk of septic infection; and, further, tends to cause prolapse of the uterus. With sexual intercourse may be associated vaginismus, ovaritis, gonorrhœa, &c. Almost every disease given in the preceding pages will illustrate our statements here.

Some minor points are worthy of consideration as favouring uterine disease; such are carelessness at the menstrual periods and after abortion, tight-lacing, and neglect of the due evacuation of the bowels and bladder.

The gynecologist can therefore help to limit disease by insisting on the proper hygiene of the bowels and bladder, by advising rest during menstruation and after abortion; and he does this more directly by taking care in all cases to prevent septic infection, to treat abortion thoroughly, and to avoid undue operative interference.

CASE-TAKING.

LITERATURE. *Emmet*—Gynecology: London, 1880, p. 57. *Simpson, A. R.*—Contributions to Obstetrics and Gynecology, Method of Case-Taking in Gynecology, p. 317.

It is of importance to give some hints as to case-taking or the investigation of cases of diseases of the female sexual organs.

In hospitals, some form of case-taking card is usually employed; and we purpose describing the method of case-taking adopted by Professor

Simpson in the Buchanan Ward (for the Diseases of Women) in the Edinburgh Royal Infirmary (see page 622).

Our first object is to learn all we can from the patient herself. This information is considered under six heads and comprised under the term ANAMNESIS, a convenient word, which literally means 'a statement of what she recollects.'

The questions asked under 'Sexual History' need little explanation. In regard to Menstruation as well as abnormal Hæmorrhage, we may note that when either follows Amenorrhœa of some weeks' or months' duration it makes us suspect abortion. Hæmorrhage coming on after the menopause usually indicates cancer, especially if followed by fetid discharge (*v.* p. 436); patients may complain of bleeding after coitus (p. 437), which is often an early sign of carcinoma. As to Dysmenorrhœa we should note whether the pain is before, during, or after the flow; we should also enquire as to clots or shreds discharged, and the latter should be examined microscopically. For the various conditions with which Amenorrhœa, Menorrhagia and Dysmenorrhœa are associated, see Index under these heads and Chap. XLVIII.

Intermenstrual discharge. Ascertain its colour; its amount—whether it requires the use of diapers; and whether it be fetid, watery, or acrid. Leucorrhœa is present in vaginitis (p. 492), cervical catarrh (p. 278), endometritis (p. 290), and wherever there is secondary catarrh of the uterine mucous membrane as in retroflexion (p. 338) and uterine polypi (p. 417); it is also present in Chlorosis (p. 616) and Phthisis. Fetid Leucorrhœa is characteristic of Carcinoma, whether affecting the cervix (p. 437) or body of the uterus (p. 465); in Sarcoma, it is not fetid till the later stages (p. 472). For other references to Leucorrhœa, see Index.

Pareunia. This refers to the absence or presence of pain during coitus (*v.* p. 494). It is enquired into only in special cases, or when the patient complains of the pain. For conditions producing dyspareunia, see Index.

PHYSICAL EXAMINATION. The *general appearance* and *configuration* should always be noted. The sallow look of the dyspeptic and constipated, yellow appearance of the chlorotic, pinched face of the patient with ovarian cyst, are in some cases helpful in giving the hint as to the line of enquiry. The student should always note anything in the appearance or configuration which may enable him to recognise the Diathesis of the patient. It is of importance to ascertain the occurrence of the gouty diathesis in a case of dysmenorrhœa, the tubercular diathesis in chlorosis, and the strumous in syphilis. The physician

ANAMNESIS.

1. Name; Age; Occupation; Residence; Married, Single, or Widow; Date of Admission.

2. Complaint and Duration of Illness.

3. General History of—(*a*) Present Attack; (*b*) Previous Health; (*c*) Diathesis; (*d*) Social Condition and Habits; (*e*) Family Health.

4. Sexual History.

(1) *Menstruation*—
  A. Normal—(*a*) Date of Commencement; (*b*) Type; (*c*) Duration; (*d*) Quantity; (*e*) Date of Disappearance.
  B. Morbid—(*a*) Amenorrhœa; (*b*) Menorrhagia; (*c*) Dysmenorrhœa.
(2) *Intermenstrual Discharge*—(*a*) Character; (*b*) Quantity.
(3) *Pareunia*.
(4) *Pregnancies*—(*a*) Number; (*b*) Dates of First and Last; (*c*) Abortions; (*d*) Character of Labours; (*e*) Puerperia; (*f*) Lactations.

5. Local Functional Disturbances—(*a*) Bladder; (*b*) Rectum; (*c*) Pelvic Nerves and Muscles.

6. General Functional Derangements—(*a*) Nervous System; (*b*) Respiratory System; (*c*) Circulatory System; (*d*) Digestive System; (*e*) Emunctories.

PHYSICAL EXAMINATION.

1. General Appearance and Configuration.

2. Mammae.

3. Abdomen—(*a*) Inspection; (*b*) Palpation; (*c*) Percussion; (*d*) Auscultation; (*e*) Mensuration.

4. External Pudenda.

5. Per Vaginam—(*a*) Orifice; (*b*) Walls and Cavity; (*c*) Roof; (*d*) Os and Cervix Uteri.

6. Bi-Manual Examination (Abdomino-Vaginal, Recto-Vaginal, Abdomino-Rectal, Abdomino-Recto-Vaginal, Abdomino-Vesico-Vaginal)—

(1) *Uterus*—(*a*) Size; (*b*) Shape; (*c*) Consistence; (*d*) Sensitiveness; (*e*) Position; (*f*) Mobility; (*g*) Relations.
(2) *Fallopian Tubes*.
(3) *Ovaries*—(*a*) Size; (*b*) Situation; (*c*) Sensitiveness.
(4) *Peritoneum and Cellular Tissue*.
(5) *Bladder*. (6) *Rectum*. (7) *Pelvic Bones*.

7. Use of—(*a*) Speculum; (*b*) Volsella; (*c*) Sound; (*d*) Curette; (*e*) Aspiratory Needle; (*f*) Tent.

8. Physical Changes in—(*a*) Nervous, (*b*) Respiratory, (*c*) Circulatory, (*d*) Digestive, (*e*) Emunctory Organs; (*f*) Skin; (*g*) Bones.

DIAGNOSIS.
PROGNOSIS.
TREATMENT.
PROGRESS AND TERMINATION.

will be puzzled by the varied complaints of the patient over some slight pelvic inflammatory condition, unless he note the thin and anxious face of a patient of nervous temperament. Information gained in this way is valuable, but must be used with discrimination. Thus cancerous patients are often florid enough, while a sallow cachectic-looking woman may have some insignificant lesion.

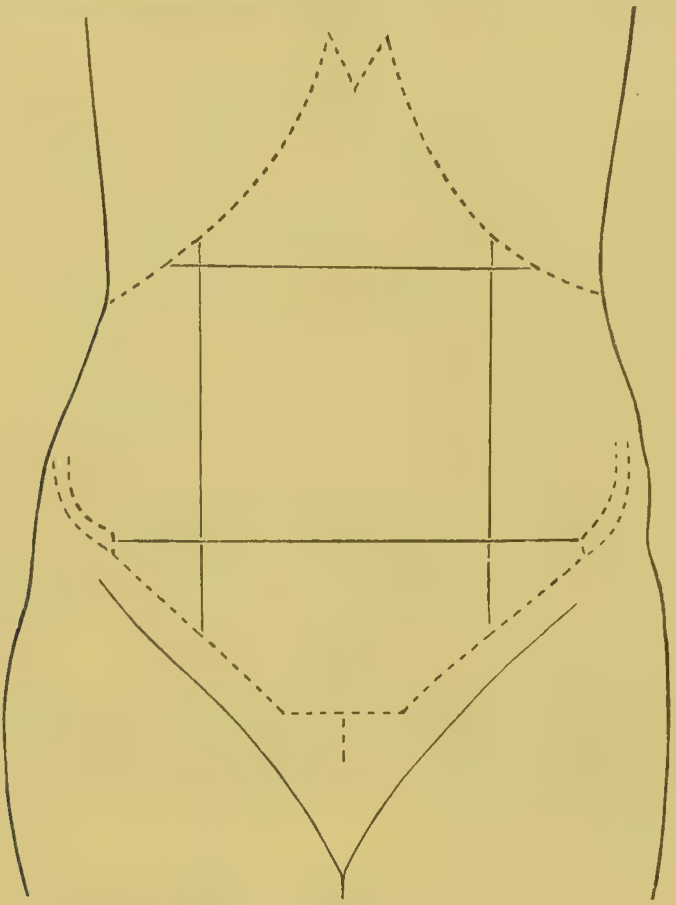


Fig. 399.
Outline diagram of abdomen for recording position of tumours relative to the bony landmarks.

Mammæ. Note whether virginal, or those of Pregnancy or Lactation.

The *abdomino vaginal examination* is the ordinary Bimanual. The abdomino-vesico-vaginal is a rare form but useful in some cases (p. 563). The *tent* is not used as a mere diagnostic except in the case of tumours in the cavity of the uterus.

Prognosis. A great deal depends on this. Thus we have to tell the patient whether her lesion is serious or slight, whether she will get well soon, or if her trouble is chronic but not dangerous. Unless she is told

Note.—The case-taking card and outline diagrams can be had at Maclachlan and Stewart.

that it is chronic, she may ultimately come to the conclusion that its nature has been misunderstood by the physician. Prognosis is often difficult to give and should always be cautious, especially as to sterility.

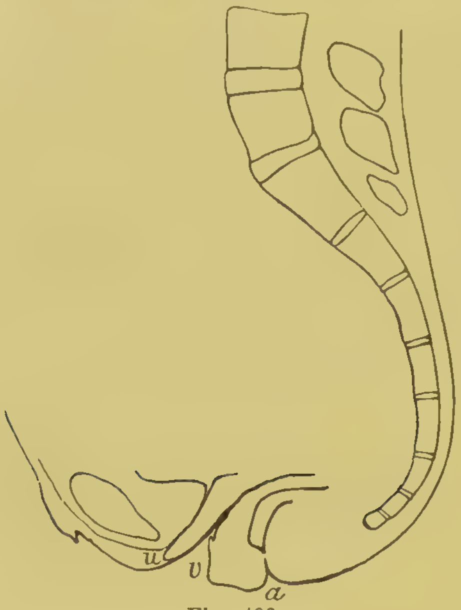


Fig. 400.
Outline diagram of pelvis for filling in position of uterus or tumours (A. R. Simpson).

Treatment. In no class of cases has the physician to be so careful not to do harm by his treatment. From the great fact that cellulitis and peritonitis cause or accompany many of the diseases of women, we should first use palliative measures. All operations should be carefully

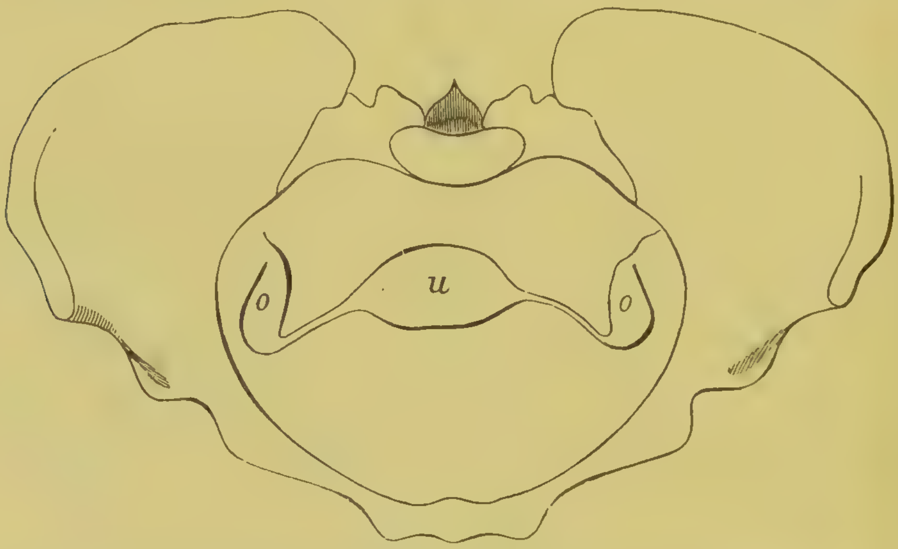


Fig. 401.
Outline diagram of pelvis as seen through the brim, to fill in position of tumours relative to uterus (Schultze).

considered, and only undertaken when we feel fairly confident they will benefit and not make the patient worse. The great success of peritoneal operations is now undoubted; but the question as to the actual good resulting from repeated cauterisation of the uterine mucous membrane, division of the cervix, stitching the cervix, &c., is more *sub lite* than is admitted in many text-books. The problem of how to remove cervical cancer without risk to life and with a fair hope of its non-recurrence is at present being worked out, and the general consensus is that removal of the uterus *per vaginam* gives as yet the best results for the patient's life. Unfortunately the patient has usually recurrence of the disease.

SOURCES OF GYNECOLOGICAL LITERATURE.

At the beginning of each subject we have already given a summary of the literature to which we were indebted ; the well-known text-books mentioned below have, to save repetition, been referred to as op. cit. The literature given, therefore, represents what we considered important, and what we had in most cases personally studied.

Gynecological Literature is, however, so extensive that a full resumé of it would have occupied several times the space we have allotted to the whole subject. We wish however to point out here the sources, so that any practitioner who wishes to ascertain the best books and monographs on any special subject may know how and where to begin his search.

The sources of Gynecological Literature are threefold :—

I. Catalogues, Dictionaries;
II. The larger text books of Gynecology;
III. Articles and Abstracts in the various Gynecological quarterlies, monthlies, and weeklies, with Retrospects and Jahrbücher.

I. Catalogues, Dictionaries.

(1.) *Index-Catalogue of the Library of the Surgeon-General's Office, U.S.A.:* Washington Government Printing Office, 1880. In this splendid work, the authors and works are arranged alphabetically; its value cannot be overrated. (*In course of publication.*)

(2.) *Nouveau dictionnaire de Médecine et de Chirurgie pratiques :* Paris, J. B. Baillière et Fils, 1870.

(3.) *Dictionnaire Encyclopédique des Sciences Médicales :* Asselin et Cie, Paris.

II. LARGER MODERN TEXT BOOKS OF GYNECOLOGY.

ENGLISH.

Barnes—The Diseases of Women: London, J. & A. Churchill, 1878.

Byford—Medical and Surgical Treatment of Women: Philadelphia, 1881.

Duncan, Matthews — Clinical Lectures: London, Churchill, 1879.

Edis—Diseases of Women: London, Smith, Elder & Co., 1881.

Emmet — Principles and Practice of Gynecology: London, Churchill, 1880.

Goodell—Lessons in Gynecology: Philadelphia, Brinton, 1879.

Hewitt—The Diseases of Women: London, Longmans, Green and Co., 1872.

Mundé—Minor Surgical Gynecology: London, Sampson, Low & Co., 1881.

Simpson, A. R.—Obstetrics and Gynecology: Edinburgh, A. & C. Black, 1880.

Simpson, Sir J. Y.—Diseases of Women (edited by A. R. Simpson): A. & C. Black, 1872.

Sims, J. Marion—Uterine Surgery: Hardwicke, London, 1865.

Tait, Lawson—Diseases of Women: Williams & Norgate, 1877.

Thomas—Treatise on Diseases of Women: London, Kimpton, 1880.

West (Duncan's Edition)—Diseases of Women: Churchill, 1879.

GERMAN.

Hegar und Kaltenbach—Die operative Gynäkologie: Stuttgart, Enke, 1881.

Schrœder—Handbuch der Krankheiten der weiblichen Geschlects-organe: Leipzig, Vogel, 1879.

Billroth's Series.

Bandl, Die Krankheiten der Tuben, der Ligamente des Beckenperitonäum und des Beckenzellgewebes;

Billroth, Die Krankheiten der weiblichen Brustdrüsen;

Breisky, Die Krankheiten der Vagina;

Chrobak, Die Untersuchung der weiblichen Genitalien;

Fritsch, Die Lageveränderungen der Gebärmutter;

Gusserow, Die Neubildungen des Uterus;

Hildebrandt, Die Krankheiten der äusseren weiblichen Genitalien;
Mayrhofer, Die Sterilität des Weibes;
Olshausen, Die Krankheiten der Ovarien;
Winckel, Die Krankheiten der weiblichen Harnröhre und Blase.

(*All published by Enke at Stuttgart.*)

FRENCH.

Bernutz and Goupil—Clinical Memoirs on the Diseases of Women: Sydenham Society Tr., 1866.
Courty—Traité pratique des Maladies de l'utérus: Paris, Asselin, 1866.
De Sinéty—Manuel pratique de Gynécologie: Paris, Doin, 1879.
Leblond—Traité élémentaire de Chirurgie gynécologique: Paris, 1878.

III. JOURNALS: RETROSPECTS: INDEXES: JAHRBÜCHER.

American Journal of Medical Sciences: New York, H. Lea.
American Journal of Obstetrics: New York, Wm. Wood & Co.
British Medical: London.
Dublin Journal of Medical Science: Dublin, Fannin & Co.
Edinburgh Medical Journal: Edinburgh, Oliver & Boyd.
Glasgow Medical Journal: Glasgow, MacDougal.
Lancet: London.
London Medical Record: Smith, Elder & Co.
Medical Press and Circular: London.
Medical Times and Gazette: London.
New York Medical Journal and Obstetrical Review: New York, Appleton & Co.
Archiv. für Gynäkologie: Berlin, Hirschwald.
Centralblatt für Gynäkologie: Leipzig, Breitkopf und Härtel.
Zeitschrift für Geburtshülfe und Gynäkologie: Stuttgart, Enke.
Berliner klinische Wochenschrift.
Wiener medizinische Wochenschrift.
Archives de Tocologie et des Maladies des Femmes, etc.: Paris, Delahaye et E. Lecrosnier.
Annali di Ostetricia, Ginecologia e Pediatria: Milano, Pietro Agnelli.

Braithewaite's Retrospect: London, Simpkin, Marshall & Co.

Index Medicus: a monthly classified Record of the current Medical Literature of the World: New York, F. Leypoldt.

Schmidt's Jahrbücher: Leipzig.

Supplement to Ziemssen's Cyclopœdia: Low, Sampson, Low, Marston, Searle, & Rivington.

Revué des Sciences Medicales: Paris, E. Masson.

Neale's Digest: London, Ledger, Smith & Co., 1882.

American Gynecological Transactions (Index at end): Boston, Houghton & Co.

London Obstetrical Transactions: Longmans, Green & Co.

Edinburgh Obstetrical Transactions: Oliver & Boyd.

INDEX OF AUTHORS.

Aitken, Lauchlan, 164.
Allingham, 602.
Arnold, 225.
Arnott, H., 443.
Ashford, 300.
Atthill, 297, 367.
Atlee, 410.
Aveling, 114.

Balfour, 69.
Bandl, 16, 44, 176, 177, 548 551, 554, 558.
Bannon, 504.
Bantock, Granville, 189, 220, 352.
Barker, 265, 432, 443.
Barkow, 504.
Barnes, 112, 237, 257, 258, 282, 297, 335, 360, 365, 368, 383, 417, 439, 442, 444, 448, 455, 494.
Battey, 85, 107, 187, 189, 190, 193, 562.
Bäumler, 607, 609, 610, 611, 612.
Bayle, 383.
Beck, Snow, 304.
Beigel, 85, 498.
Bennet, Henry, 290.
Bennet, Hughes, 200.
Bernutz, 149, 151, 163.
Berthold, 504.
Billroth, 402.
Bird, 300
Blau, 429.
Blundell, 187.
Bouqué, 596.
Bourdon, 163.
Bozeman, 106, 133, 584.
Brandt, 310.
Braun, Carl, 309, 548.
Braune, 46, 63.
Breisky, 26, 268, 434, 478, 479, 486, 497.
Brown, Baker, 216.
Bruckner, 498.
Brunton, Lauder, 141.
Budin, 25.
Byford, 581.
Byrne, 257, 367, 424, 454.

Campbell, H. F., 346, 347.
Cappie, 378.
Chadwick, 35.
Championnière, 67.
Cheyne, Watson, 159.
Chiari, 246, 466.
Chisholm, 432.
Chrobak, 470.
Cintrat, 406.
Claudius, 46
Clay, 472, 474.
Coghill, 241, 589.
Cohnheim, 467.
Cohnstein, 298.
Collis, 615.
Courty, 365, 368.
Credé, 166, 297, 360.
Croom, 563.
Crosse, 357, 359, 360, 361, 371.
Cruveilhier, 46, 386.
Cullingworth, 201.
Cunningham, 11.
Cusco, 112.

Dalton, 81, 85.
De Cassis, Vidal, 596.
De Morgan, Campbell, 450.
De Sinéty, 19, 20, 197, 282, 286, 288, 293, 303, 416, 418.
Dohrn, 479.
Doran, 196.
Drysdale, 200.
Düll, 378.
Duncan, John, 517.
Duncan, Matthews, 114, 221, 356, 365, 386, 397, 513, 537, 540, 544, 566.
Dunlap, 565.

Eade, 378, 387.
Eichwald, 199.
Emmet, 105, 114, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 278, 283, 305, 309, 365, 366, 368, 483, 510.
Engelmann, 83, 84, 189, 192.
Englisch, 183.
Eppinger, 445, 464.

Farr, 543.
Farre, 22.
Fehling, 409.
Fergusson, 109.
Finn, 304.
Fischel, 275.
Foster, 6, 50, 61, 62.
Fothergill, Milner, 618.
Foulis, 69, 97, 143, 150, 195, 198, 201, 202.
Fournier, 612, 613, 614, 616.
Fox, Wilson, 196.
Fränkel, 555.
Frankenhäuser 69.
Freund, 42, 158, 193, 357, 376, 381, 459.
Friedreich, 507.
Fritsch, 277, 318, 320, 328, 333, 334, 335, 336, 355, 357, 358.
Frommel, 246.
Fürst, 230.

Galabin, 471.
Gallard, 308.
Garriguez, 31.
Gehrung, 331.
Gilmore, 189, 211.
Goltz, 141, 575.
Goodell, 179, 188, 211, 515, 525.
Goodsir, 455.
Goupil, 149.
Greenhalgh, 241, 324, 398.
Guérin, 38, 39, 42, 67, 149.
Gusserow, 376, 381, 383, 384, 387, 388, 402, 429, 432, 434, 435, 443, 448, 464, 470, 471, 472, 474, 540.

Habit, 442.
Hamilton, 151, 211.
Hanks, 101, 114, 123, 128, 129.
Hanot, 388.
Harris, 196.
Hart, 39, 40, 56, 74, 76, 101, 133, 242, 347, 352, 525.
Hasse, 51, 52.
Hecker, 551.
Hegar, 187, 192, 253, 298, 402, 406, 424, 461, 463, 496, 531.
Henle, 9, 26, 30, 36, 46.
Hennig, 15, 236, 360, 554.
Hewitt, Graily, 318, 330.
Heyfelder, 549.
Hicks, Braxton, 208, 365, 367, 413.
Hildebrandt, 395, 491, 494, 504, 507, 508, 510, 520.
Hilton, 600, 603, 604.
Hodge, 347, 348.
Holden, 511.
Holdhouse, 387.
Houston, 35.
Hubert, 388.
Hüe, 387, 388.
Huguier, 258, 506, 525, 532.
Hutchinson, Jonathan, 216, 467, 607, 612, 614, 615.

Hyde, 511.
Hyrtl, 35, 65, 67.

JACKSON, REEVES, 310.
Jacubash, 471.
Jastrebow, 205.
Jennison, 114.
Jobert, 578.

KALTENBACH, 192, 298, 402, 462, 463, 577, 580.
Kaschkaroff, 306.
Keith, 143, 214, 216, 218, 220, 222.
Kehrer, 543.
Kidd, 387.
Kinkead, 81.
Kiwisch, 301, 554.
Klebs, 158, 375, 426, 427, 468.
Kleeberg, 406.
Klemm, 298.
Klob, 246, 301, 383.
Koch, 159.
Koeberlé, 171, 402, 409.
Kohlrausch, 49.
König, 44, 160.
Kroner, 366.
Kuchenmeister, 133, 242, 326.
Kundrat, 83, 84.
Kunert, 470.
Kussmaul, 549.
Küster, 381.
Küstner, 498.

LANCEREAUX, 607, 610.
Landau, 126.
Le Bec, 42, 68, 149.
Leblond, 298.
Lee, 263, 268, 372, 612.
Leopold, 68, 84, 85, 375, 409.
Lister, 135, 136, 219, 220, 483.
Lœwenhardt, 85.
Lorey, 376.
Löwenstein, 26.
Luschka, 12, 28, 44, 46.
Lusk, 68, 150.

M'CLINTOCK, 389.
Macdonald, Angus, 300, 365.
Macintosh, 240, 324.
Malassez, 197.
Malgaigne, 439.
Marckwald, 253.
Martin, 193, 309, 381, 531.
Mayer, 510.
Meyer, 504.
Miner, 220.
Mitchell, Weir, 157, 309.
Möricke, 84.
Müller, 470.
Mundé, 126, 130, 184, 186, 211, 263, 265, 267, 331, 342.
Murphy, 388.

NÉLATON, 163, 215.
Neugebauer, 110.
Nieberding, 265, 267.
Nœggerath, 151, 174, 195, 196, 302, 365, 367, 371, 563.
Nonat, 149.

OLDHAM, 415, 481.
Ollivier, 163.
Olshausen, 181, 286, 287, 291, 292, 293, 297.
Otto, 505.

PALLEN, 263, 265, 268, 547.
Paquelin, 138, 139.
Parkes, 561.
Patenko, 196.
Pawlik, 566.
Péan, 217, 402, 406.
Pichot, 465.
Picot, 432.
Pflüger, 195.
Pirogoff, 38, 42, 49, 53.
Pott, Percival, 183.
Puech, 479, 487.

QUAIN, 70, 90.

RAINEY, 17.
Ramsbotham, 505.
Recamier, 130, 131, 163.
Recklinghausen, 159.
Reid, W. L., 547.
Rein, 410.
Reinmann, 300.
Richet, 15.
Ricord, 607, 611.
Rindfleisch, 198.
Rokitansky, 178, 196, 317, 355, 551.
Roser, 262, 263.
Routh, 241, 288, 292, 450.
Ruedinger, 35, 43, 51, 90, 601.
Ruge, 19, 20, 263, 274, 275, 286, 335, 426, 427, 434, 441, 464, 489, 490.

SAPPEY, 15, 68.
Savage, 361 189, 241.
Scanzoni, 300, 301, 309, 355, 508.
Schlesinger, 45.
Schrœder, 15, 60, 62, 166, 197, 200, 214, 268, 284, 286, 288, 300, 318, 329, 367, 375, 378, 383, 388, 402, 403, 428, 434, 442, 443, 456, 457, 462, 463, 464, 465, 470, 477, 481, 488, 489, 497, 510, 525, 549.
Schultze, 48, 50, 52, 62, 126, 157, 180, 240, 280, 318, 379.
Seyfert, 443.
Sibley, 432.
Simon, 98, 100, 130, 131, 135, 253, 451, 563, 583, 596.
Simpson, A. R., 74, 76, 101, 114, 121, 131, 151, 189, 193, 254, 294, 295, 347, 355, 358, 369, 371, 388, 395, 398, 444, 455, 469, 470, 472, 484, 498, 517, 563, 619.
Simpson, Sir J. Y., 113, 122, 123, 149, 240, 241, 246, 248, 262, 297, 319, 324, 325, 381, 396, 424, 432, 433, 443, 447, 451, 453, 455, 465, 503, 505, 506, 510, 511, 586, 588.
Sims, 77, 105, 114, 123, 130, 131, 187, 192, 193, 218, 240, 252, 253, 315, 319, 325, 326, 399, 457, 495, 531, 582.
Skene, 30, 560, 565, 568.
Slavjansky, 196, 289.
Smith, Albert, 347.
Smith, Heywood, 281, 282.
Smith, Protheroe, 114, 350.
Smith, Tyler, 365.
Solowieff, 540.
Späth, 548.
Spiegelberg, 39, 43, 197, 268, 372, 410, 441, 499.
Steurer, 150, 158.
Stiegele, 510.
Storer, 601.
Sutton, 266.

TAIT, LAWSON, 85, 123, 128, 129, 171, 174, 177, 188, 189, 220, 221, 369, 422.
Tate, 365, 368.
Taylor, 15, 356
Thiersch, 427.
Thomas, 114, 130, 131, 211, 244, 257, 281, 283, 301, 304 309, 327, 328, 331, 349, 364, 365, 367, 369, 379, 397, 398, 402, 405, 454, 485, 486, 492, 493, 507.
Thornton, 217, 220, 401, 402.
Tillaux, 380.
Tilt, 496.
Times, 377.
Trenholm, 188.
Turner, 19, 35, 70, 378.

UFFELMAN, 28, 30.
Underhill, 415, 416.

VAN BUREN, 602.
Van de Warker, 52.
Veit, 19, 20, 263, 274, 275, 426, 427, 434, 441, 497.
Virchow, 43, 157, 166, 301, 317, 375, 377, 383, 410 426, 427, 467, 616.
Voisin, 163, 170.
Von Preuschen, 496.
Von Sigismund, 612.

WALDEYER, 69, 195, 198, 426, 427.
Warner, 537.
Wegner, 615.
Wells, Spencer, 191, 214, 216, 218, 220, 221, 222, 372, 402, 404.
West, 221, 510.
White (of Buffalo), 365, 367.
Whitehead, 246.
Williams, 82, 83, 84, 354, 450, 540.
Wilson (of Baltimore), 139.
Wilson, W., 553.
Wiltshire, 221.
Winckel, 258, 333, 383, 490, 560, 580, 581, 582.

ZWANCK, 527.

INDEX OF SUBJECTS.

Note.—As the student will see in the *Table of Contents* the details of each special subject, we give only one reference—in bold figures—to the pages where each subject is specially treated of. Passing references in other parts of the book, are given fully.

Thus, for the "Pathology of Carcinoma Uteri," see "Carcinoma Uteri" in *Table of Contents;* for references to carcinoma, not contained in the chapter on carcinoma, see Index.

For instruments figured in text, see *Instruments* in *Classified List of Illustrations.*

ABDOMEN—distension of, in ovarian tumour 205.
Abdominal contents, relation to skin 89.
  examination **88**.
  pressure, action on uterus 311.
  regions 89.
  section for pelvic abscess 171.
    in hæmatocele 167.
Abortion **544**.
  and endometritis 289, 290, 291, 293, 294.
  causing pelvic peritonitis 150.
  in retroflexion 338, 339.
  cause of subinvolution 304, 305.
  and syphilis 615.
Abscess—pelvic 158, 160.
  opened by cautery 162.
  tapping of 162.
  of uterine wall 300.
Adhesions—limiting Hæmatocele 164.
  diagnosis in Ovarian tumours 209.
  treatment in Ovarian tumours 218.
Age—influence on carcinoma 432, 434.
    on fibroid tumours 383, 384.
  in relation to menstruation 79.
Amenorrhœa 536.
  due to atresia 480.
  in chlorosis 617.
  physiological 537.
  in superinvolution 246.
Ampulla of Fallopian tube 21.
Amputation—of cervix 252.
  ,, hypertrophied in prolapsus 259.
  of inverted uterus 371.
Anæmia in hæmorrhagic endometritis 290, 291.
Anæsthetics **140**.
Anteflexion of uterus, 312, 314, **315**.
Anteflexion and small fibroid tumour 391.
  pathological 99, 158.
    mistaken for retroversion 316, 334.
  passage of sound in 118.
Anteversion of uterus 313, 314, **328**.
  due to chronic metritis 328.
Antiseptics in gynecology 135.
Antiseptic douche 136.
Anti-thermic shield 139.
Anus 35.
  fissure of 602.
  ,, producing vaginismus 494.
Areolar hyperplasia—of cervix 278.
    of uterus 301.
Arsenic in membranous dysmenorrhœa 542.
Ascites and ovarian tumours 206.
Ascitic fluid, in malignant ovarian disease, 150, 198, 202.
Asphyxia from chloroform 143.
Atresia of cervix uteri **236**.
    senile 288.
  in septate uterus **487**.
  of vagina **476**, 477.
  dangers of operation for 483.
Atrophy of cervix and uterus **245**.
  congenital, of uterus 230, 231, 235.
Auscultation, 91.

BACTERIA, in cellulitis 158.
  in erysipelas, 159.
Baden-Baden waters in chronic metritis 308.
Ballottement, in extra-uterine gestation 554.
Barnes' ointment-positor 297.
  speculum for vaginal tampons 282.
Bartholinian glands 5, 10.
  cysts of 508.
  inflammation of 506.
  abscess in 509.
Battey's operation, 85, **187**.
  in dysmenorrhœa 512.

- Benzoate of ammonia in cystitis 572.
- Bimanual Examination **93**.
  - in anteflexion 321.
  - in early pregnancy 307.
  - in inversion 361.
  - position of hands in 94.
  - to replace retroflexed uterus 343.
  - in retroflexion 340.
  - in retroversion 333.
  - with sound 121.
  - for stone in bladder 574.
  - in uterine displacements 315.
- Bladder, Anatomy of **27**, 561.
  - affection of, in carcinoma 429, 431.
  - in amputation of cervix 260.
  - attachment to anterior vaginal wall 57.
  - calculi in 573.
  - changes in, after fistula **579**.
  - changes in position of 34.
  - diastole of 33.
  - dilated, in carcinoma 431.
  - displacements of **569**.
    - in extra-uterine gestation 556.
    - in retroflexed gravid uterus 546.
  - distended, and ovarian tumours 207, 209.
  - functional diseases of **574**.
  - injuries to in ovariotomy 218.
  - ligaments of 34.
  - malformations of 567.
  - methods of exploring, **562**.
  - physiology of 561.
  - neoplasms of **570**.
  - position 27.
  - position in inversion of uterus 359.
  - pressure on, by fibroid tumour 387.
  - in retroflexion 336.
  - shape when empty 33.
  - shape in fœtus 33.
  - structure 30.
  - systole and diastole of 561.
  - effect of its distension on the Uterus 53, 311, 312, 332.
- Blaud's pills in chlorosis, 618.
- Blistering of the cervix uteri 309.
- Blood effusion into pelvis 164.
- Bloodvessels of pelvis **64**.
- Bougies graduated, to dilate cervix 240.
- Breisky's instruments for operating in atresia 486.
- Bright's disease in fibroid tumour 388.
- Broad ligament 38.
  - affections of 179.
  - anatomy 17, **38**.
  - blood effusion into 164.
  - cellular tissue of 41.
  - position 39.
- Bromide of Potassium in chronic metritis 308.
  - in fibroid tumours 396.
  - in ovaritis 182.
- Bromine Solution in Carcinoma 448, 450.
- Bulbocavernosi 9.
- Bulbi Vaginæ 10.
- CACHEXIA in Carcinoma 438.
  - in Sarcoma 472.
- Calcification of fibroid tumours 381.
- Calculi in bladder **573**.
- Cancer (see Carcinoma).
- Carbolic acid in cervical catarrh 281.
  - in endometritis 294.
  - in pruritus vulvæ 508.
- Carcinoma—of bladder 570.
  - of cervix **425**, **436**, **446**.
  - cure by amputation 455.
  - commencement in cervix 280
  - duration of life in 443.
  - and endometritis 293.
  - of Fallopian Tubes 178
  - in male and female compared 432.
  - affecting fibroid tumours 382.
  - combined with Sarcoma 468
  - diagnosis from Sarcoma 473.
  - spontaneous cure of 442.
  - of body of Uterus **464**.
  - of vagina **498**.
    - secondary 431.
  - of vulva **510**.
- Carlsbad salts 308.
- Case-taking, method of **621**.
  - A. R. Simpson's card for 622.
- Cataleptic convulsions and lacerated cervix 266.
- Catarrh of cervix 273.
    - diagnosis from vaginal 280.
  - of Fallopian tube 176
  - of uterus 285.
- Catarrhal patches 276
- Catheter—methods of passing 562.
  - Skene-Goodman 572.
  - stationary, for fistula 593.
- Cauliflower excrescence 426, 439.
- Caustics producing atresia 236.
  - in carcinoma 450, 459.
- Cautery in dividing cervix 397.
  - in incising capsule of fibroid 398.
  - in laparotomy for fibroids 404, 405
  - in ovariotomy 216.
  - Paquelin's 138.
  - in opening vaginal cysts 498.
- Cellular tissue of pelvis, hæmorrhage into 167 (*v.* Connective tissue).
- Cellulitis, pelvic **157**.
  - and anteflexion 322.
  - diagnosis from anteversion 329.
  - producing anteversion 328.
  - and lacerated Cervix 264.
  - relation to peritonitis, 149.
  - and retroflexion 341.
  - in Utero-sacral ligaments 318.
- Cervical catarrh in lacerated Cervix, 265.
  - with Retroflexion 334.
- Cervical mucus, character of 279.
- Cervical plug, Thomas' 244.
- Cervical polypus 415.
- Cervix—amputation of 252.
    - in carcinoma 451.
    - in prolapsus 259.
    - producing involution 309.
  - anatomy **415**.
  - atrophy of **245**.

Cervix—atresia of **236**, 481.
operation for 486.
senile 288.
dilated above stenosis 237.
dilatation of 240.
division of, in cervical catarrh 281.
antero-posterior division of 325.
bilateral division of 240, 241, 325.
cancer of (see Carcinoma).
carcinoma of **425**, **436**, **446**.
catarrh of **273**.
chronic thickening of 251, 276.
conical, 237.
closure for vesico-uterine fistula 593.
descent in prolapsus, 522.
dilatation of 124, 397.
displacement in retroflexed gravid uterus 546.
examination of 92.
fibroid tumour of 373, **382**.
glands of 19.
hypertrophy of **237**, 250.
in prolapsus 524.
induration of, in carcimona 441.
in infantile uterus 230, 235.
position in Inversion 357.
laceration of **262**.
producing cervical catarrh 278.
mucous membrane of 19.
normal structure contrasted with pathological 277.
position in retroversion + retroflexion 334.
rupture in atresia 480.
stenosis of 236.
in superinvolution 246.
supra-vaginal amputation of 451, 456.
vaginal aspect of 20.
Chancre, hard and soft 610.
Channelled polypus 415.
Chloral in carcinoma 448.
Chloride of zinc in carcinoma 459.
Chloroform—action of 140.
death from 143.
Chlorosis **616**.
amenorrhœa in 536.
leucorrhœa in 289.
small Uterus in 230, 245.
Cholera and endometritis 289.
Chromic acid—in cervical catarrh 282.
in endometritis 295.
Chronic Metritis and fibroid tumour 390.
Cintrat's Serre-noeud, 403, 406.
Clamp in ovariotomy 216.
disadvantages of 216.
in laparotomy for fibroids, 404, 405.
Cleavage in pelvic floor, lines of 58.
Clitoris—anatomy 4.
development of 503.
Cloaca 502.
persistence of 503.
Colpitis 489.
emphysematosa 489.
Conception in an undeveloped horn 232.
Constipation **605**.
in fistula 581.
Connective tissue of pelvis **40**.
as seen in sections 40.
studied by injections 44.
spread of carcinoma in 428, 431.
relation to cellulitis 158, 160.
Connective tissue of uterus, increase of in metritis 303.
Connective-tissue origin of cancer 427.
Coccygeus 12.
Coccygodinia **606**.
Corpus luteum of menstruation and pregnancy 81.
Cradle-pessary of Graily Hewitt 330
Credé's method of expressing placenta 360.
Curette **130**, 294.
nail, A. R. Simpson's 398.
Recamier's 131.
Simon's 131.
Sims' 131.
Thomas' 131.
in carcinoma 451.
in cervical catarrh 283.
in endometritis 292, 296.
in diagnosis of small polypi 420.
in sarcoma uteri 473, 474.
Cystic fibroid tumours 409.
Cystitis **570**.
Cystocele 570.
in prolapsus 524.
Cysts in the cervix 276, 277.
Cystoma ovarii 198.
Cysto-fibroma 409.

DECIDUA, in extra-uterine gestation, 551.
Defæcation—mechanism of 600.
difficult in hæmatocele 168.
in retroflexed gravid uterus 546.
painful 328.
in carcinoma 438.
in retroflexion 337, 338.
want of control, in ruptured perineum 516.
Dermoid cysts 199.
Development—intra-uterine periods of 230
of Pelvic organs **69**.
of uterus, period of 225.
Diabetes, pruritus in 507.
Diagnosis—sound in 119.[1]
volsella in 104.
Diathesis—strumous and tubercular 281, 293.
syphilitic 230.
Diet in carcinoma 448.
in peritonitis 154.
Weir Mitchell's system of 309.
Digestive derangements in endometritis 290, 291.
Dilatation of cervix 466, 124.
by rapid method 422.
Dilators—Tait's and Hanks' 128.
various forms of 240, 241.
Diphtheritic inflammation and carcinoma 441, 442.
Discharge—fœtid, in carcinoma 536, 427.
in carcinoma of body of uterus 465.
watery, in sarcoma uteri 472.

Discus proligerus, 24.
Displacements of Pelvic Floor 58, **521**.
,, of uterus 311.
due to cellulitis 157, 161.
hæmatocele 164, 169.
ovarian tumours 203.
peritonitis 161.
relation to chronic metritis 305.
to endometritis 289, 290.
diagnosed with sound, 119.
etiology 314.
physiological and pathological 312.
symptoms of 314.
produced by volsella 103.
Douche—antiseptic 136.
forms of 137.
Douglas, Pouch of 38.
Drainage of abscess 162.
after Battey's operation 190.
in Extirpation of uterus 461.
in Ovariotomy 219.
Drop-cork for chloroform 141.
Dysmenorrhœa **538**.
in anteflexion 319.
mechanical and congestion theories of 319, 320.
relation to Battey's operation 187.
in cellulitis 161.
stenosis of cervix 238.
endometritis 290, 291.
fibroid tumours 386.
uterine polypi 417, 418.
retroflexion 338.
membranous 539.
obstructive 237.
spasmodic 539.
Dyspareunia in anteflexion 320, 321.
in peritonitis 152.
causes 494.
definition 494.
in prolapsed ovary 184.
treatment 495.

Ecraseur—in amputating cervix 257.
mode of application 453.
for removal of ovaries 190.
polypi 424.
and galvano-cautery, relative advantages 452.
Ectropium of cervix 276.
Elastic ligature in amputating uterus 372.
in laparotomy for fibroids 404, 407.
Electrolysis in ovarian tumour 211.
Elythrytis 489.
Emaciation in carcinoma 438.
Emmet's operation for lacerated cervix 268.
Ems, waters of, in endometritis 298.
in chronic metritis 308.
Endometritis **285**.
relation to abortion 291.
in anteflexion 321, 322.
leading to chronic metritis 305.
diagnosis by sound 119.
Endometritis changes in final stage of 417.
fundal 288, 292.
fungosa of Olshausen 287, 293, 297.
hæmorrhagic type and carcinoma of the body 466.
and sarcoma 473.
secondary to stenosis of cervix 238.
three types of 286.
Enterocele, vaginal 532.
Enucleation of Fibroid tumours
spontaneous 375, 379, 388.
artificial 398.
of ovarian tumours 220.
Epispadias 505.
origin of cancer 427.
Epithelioma of the cervix 425.
Erector Clitoridis 9.
Ergot and endometritis 294, 395.
methods of administration in menorrhagia 537.
Ergotine—hypodermic injection of 396.
in treatment of fibroids 395.
Erosion—follicular 275.
and lacerated cervix 264.
papillary 274.
papillary and carcinoma 441.
simple 274, and Plate VIII.
Ether 140.
Ethidene 140.
Eversion of lips of cervix 264, 267, and Plate VIII.
Examination of cases 623.
posture in 78.
Exanthemata and endometritis 288, 289.
vaginitis in 491.
atresia vaginæ after 479.
External Genitals—anatomy 3.
development 70, 502.
relation in erect posture 6.
examination of **91**.
lymphatics of 67.
Extirpation of uterus—through abdominal walls 459.
through vagina 462.
Extra-uterine gestation **548**, 551.
and fibroid tumour 393.
causing hæmatocele 156, 556.
Exudations in the pelvis 159.
course of 160.
Epithelial cells found in Carcinoma 439, 440.

Facies, cancerous 437.
Fallopian Tubes—anatomy **20**.
abnormalities 175.
blood-sacs in 477.
catheterisation of 175.
development of 69.
distension with pus or blood **177**.
divisions 21.
functions 174.
inflammation of **176**.
palpation of 174.
patulous condition of **175**.
position 21.

Fallopian Tubes—removal by abdominal incision 177.
  affected with sarcoma 470.
  stricture of **175**.
  gestation in 548.
  structure 21.
  tumours of **178**.
Fatty degeneration around polypoidal fibroid 355.
  in fibroid tumour 381.
Fevers causing ovaritis 181.
Fibroid tumour of uterus **373**, **385**, **395**.
  producing anteflexion 318.
  and anteflexion 322.
  Battey's Operation for 188.
  and carcinoma 434.
  and chronic metritis 307, 390.
  and extra-uterine gestation 553, 554.
  +Inversion 360.
  pediculated submucous **412**.
  sloughing and carcinoma 441, 442.
  and retroflexion 341.
  sarcomatous degeneration of 469.
  and sarcoma 473.
  spontaneous expulsion of 414.
Fibroid tumours of vagina **497**.
  tumour of cervix 373, **382**.
Fibromata of vulva **510**.
Fibro-myoma uteri 373.
Fibrous tumour of uterus (*v.* Fibroid).
Fimbriated end of Fallopian tube 21.
Flexions of uterus 312.
Flooding, producing superinvolution 246 (*v.* Hæmorrhage).
Fibro-cystic tumours of the uterus **409**.
  and ovarian tumours 208.
Fœtal heart—in diagnosing pregnancy 307, 393.
Fœtal life—malformations arising in 231.
Fœtus in detached horn of uterus 233.
Forceps and lacerated cervix 263.
  used for extracting fibroids 401
  and fistula 580.
  and ruptured perineum 514, 515.
Fornices—condition of, in peritonitis and cellulitis 160.
  effect on uterus of digital pressure in 77.
  examination of 93.
  position of, in hypertrophied cervix 258.
Fossa Navicularis—anatomy 5.
  irritability producing vaginismus 494.
Freund's extirpation of uterus 459.
Friedrichshall water 308.

Galvano-Caustic Wire in removal of polypi 424.
  for amputation of inverted uterus 372.
  in amputating cervix 257.
  compared with ecraseur 452.
  mode of application 454.
Gastro-elytrotomy 31.
Gehrung's anteversion pessary 330.
Genito-crural nerve, affection in ovarian tumour 205.
Genupectoral posture **72** *et seq.*
Genupectoral posture to replace retroflexed gravid uterus 547.
  in replacing retroverted uterus 347.
Germinal vesicle 24.
Gestation—abdominal 548, 549, 557.
  in detached horn 232, 233, 549.
  in Fallopian tube 548 *et seq.*
  interstitial 550.
  in a septate uterus 232.
  in an undeveloped horn, 232, 233.
Glycerine plug, making of 182.
Gonorrhœa—causing ovaritis 181.
  cystitis 571.
  peritonitis 151.
  vaginitis 491.
  and endometritis 289.
  latent in the male 151.
  and metritis 300.
Gonorrhœal vaginitis, diagnosis from simple 492.
Gouty diathesis and dysmenorrhœa 542.
Graafian follicles—development 195.
  distension of 195.
  number 24.
  position 24.
  rupture of 79.
  structure 24.
Greenhalgh's intra-uterine stem 324.
  pessary for prolapsus 526.

Hæmatocele—pelvic 163.
  and rupture of extra-uterine gestation 552, 553, 556.
  and fibroid tumour 393.
Hæmatoma 167.
  of vulva 511.
Hæmatosalpinx 177.
Hæmorrhage in amputation of cervix.
  in carcinoma uteri 436.
  in carcinoma of body of uterus 465.
  causing death in carcinoma 443, 445.
  in carcinoma, treatment of 447.
  in fibroid tumours 385, 386.
  fatal, from fibroid tumours 386.
  internal, in operation for atresia 483.
  intra-peritoneal and extra-peritoneal 167.
  in inversion of uterus 360.
  into the peritoneum of pelvis 163.
  post partum 268.
  in sarcoma uteri 471, 472.
  in uterine polypi 417.
Heart, action of chloroform on 141.
Hernia and hydrocele 178.
Hegar's amputation of cervix 253.
  method of laparotomy for fibroids 406.
Heredity, influence on carcinoma 432.
Hermaphroditism **503**.
  false 504.
  true 504.
Hernia of fibroid tumour 378.

Hernia of ovary **183.**
Hernial nature of prolapsus 524, 532.
Hewitt's (Graily) cradle-pessary 330.
Higginson's syringe 137.
Hodge pessary 347, 348.
  mode of action 352.
Houston, valve of 35.
Hunyadi Janos water 308.
Hydatid of liver and ovarian tumour 207, 209.
Hydramnios and ovarian tumour, 207 208.
Hydrargyri pernitratis liquor in cervical catarrh 281.
Hydrocele of round ligament **178.**
Hydronephrosis in cystitis 571.
  in carcinoma 429.
Hymen—atresia of 476.
  development of 479.
  forms of 4, 6.
  imperforate, operation for 483.
  persistent or inflamed, producing vaginismus 494.
Hypodermic injection of morphia 155.
Hydro-peritoneum and Battey's operation 189.
Hydrops folliculorum 198.
  tubæ 177.
Hyperplasia areolar of uterus 301.
  of cervix 278.
Hypertrophy—primary, of cervix 250.
  secondary, of cervix 250, 257.
Hypospadias 503.
Hysteria—due to ovaritis 182.
  small uterus in 230.
  in superinvolution 246.
Hystero-epilepsy and Battey's operation 188

ICE-BAGS in hæmatocele 170.
Ice-cap 219.
Ice-cot 219.
Ice in peritonitis 156.
Incontinence of urine **575.**
India-rubber ring to control hæmorrhage 269.
Infarct of uterus 301.
Inflammation of uterus 285.
  in muscular coat of uterus 299.
  of peritoneum and cellular tissue 148.
  puerperal 299.
Inflammatory deposits in fibroid tumour 393.
Infundibulo-pelvic ligament 23.
Inguinal glands 67, 68.
  affection in carcinoma 431.
Injections—intrauterine, in endometritis 298.
  into uterus and tubes 176.
  dangers of 177.
Interstitial metritis 302.
Inter-ureteric ligament 32.
Intestinal obstruction due to fibroid tumours 387.
Intestines—in pouch of Douglas 54.
  relation to uterus and pelvic floor 54.
Intra-abdominal pressure upon pelvic floor 59, 71.
  in prolapsus 523, 524.
Intra-abdominal pressure, action on rectum 600.
Intrauterine galvanic-stem 248.
Inversion of uterus **355.**
  caused by fibroid tumour 381.
  diagnosed from fibroid tumour 390.
    pediculated fibroid with inflammatory adhesions 420.
  mechanism of 355.
  in prolapsus 524.
  in sarcoma 470.
Inverted uterus—amputation of 371.
  replacement of—Barnes' method 368.
    Courty's method 368.
    Emmet's method 366.
    Lawson Tait's method 369.
    Nœggerath's method 367.
    Tate's method 368.
    Thomas' method 367.
    White's method 367.
Involution and operations on cervix 268.
  senile 223.
Iodide of potassium in syphilis 613.
  in chronic metritis 308.
Iodine in cervical catarrh 281.
  in endometritis 295.
Involution artificially produced by amputation of cervix 309.
Iodoform—in vaginismus 495.
  in pruritus vulvæ 508.
Isthmus—of uterus 14.
  of Fallopian tube 21.

KISSINGEN waters in chronic metritis 308.
Knives 133.
Kolpokleisis 596.
Kreuznach waters in endometritis 298.
  in chronic metritis 308.
  in treatment of fibroids 397.
Kuchenmeister's scissors for dividing the cervix 243.

LABIA MAJORA, anatomy 4.
  Minora, anatomy 4.
    development 503.
Labour—atony of uterus in 3d stage of, due to chronic metritis 306.
  rapidity of, and lacerated cervix 265.
  complicated by polypus 417, 418.
  protracted, producing fistula 580.
Laceration of cervix 262.
  and cellulitis 158.
  and subinvolution 304, 305
  of perineum 513.
Lactation—effect on uterus if protracted 246.
  and subinvolution 304, 305.
Laminaria tents 124, 127.
Laparotomy, for extra-uterine gestation 554.

Laparotomy, for fibroid tumours 401.
Lateri-version of uterus 313.
Leeches—application of, to cervix 283.
  in peritonitis 156.
Leucorrhœa—as a symptom 621.
  in anteflexion 319, 321.
    cervical catarrh 275, 278, 279.
    chlorosis 618.
    chronic metritis 305.
    endometritis 286, 290.
    hypertrophied cervix 251.
    lacerated cervix 266.
    retroflexion 337, 338.
    uterine polypi 417.
    vaginitis 492.
    vaginal cysts 497.
  producing pruritus 507.
Levator Ani 12.
Ligature in ovariotomy 217.
Lineæ albicantes 88.
Lipomata of vulva **510**.
Listerism—in gynecology 135, 159.
  in ovariotomy 220.
Literature, Gynecological—Sources of **624**.
Lithia water in pruritus 507.
  salts of, in irritable bladder 575.
Lithopædion 553.
Locomotion impaired in uterine inflammation 328.
Lymph, coagulable—from fibroid tumour 409.
Lymphatics—relation to cellulitis 158, 160.
  of external genitals 63.
  in fibroid tumours 375.
    dilatation of 409.
  relation to septicœmia 68.
  of uterus 68.
    dilatation in metritis 303.
  of vagina 68.
Lymphatic glands of pelvis **67**.
  in carcinoma 429.

MALFORMATION of uterus 225.
  rectal examination in 232.
Malignant peritonitis 150.
Marckwald's amputation of cervix 253, 254.
Marriages, average productivity of 543.
Marriage and syphilis 613.
Massage 157.
  general, in uterine disease 309.
  in pathological anteflexion 323.
  uterine 309.
Medullary Cancer 425.
Membrana granulosa 24.
Menopause and Battey's operation 193.
  changes in cervix after 236.
    in uterus after 245, 288.
    in vagina after 491.
  influence on fibroid tumours 383, 394.
  premature 536.
Menorrhagia **537**.
  in anteflexion 319, 321.
    carcinoma 437.
    lacerated cervix 266.
    stenosis of cervix 238.
    chronic metritis 305.
Menorrhagia in endometritis 286, 290.
    fibroid tumour 385.
    hæmatocele 167.
    inversion 360.
    ovaritis 182.
    peritonitis 152.
    uterine polypi 417.
    retroflexion 338.
    retroversion 333.
    treatment by Battey's operation 188.
Menstruation **79** *et seq.*
  and Battey's operation 193.
  irregular, in cervical catarrh 278, 279.
  diminished in chronic cellulitis 158.
  and endometritis 286, 294.
  absence in fistula 581, 598.
  during gestation 232.
  relation to hæmatocele 163.
  and metritis 299, 300.
  periodicity and duration 80.
  descent of Polypus during 414.
  in an undeveloped horn 232.
  in bicornuous and septate Uterus 232.
Menstrual blood—composition 80
  origin 82.
  quantity 80.
  character of retained 479.
Mercury in syphilis 612.
Metritis 285.
  acute **299**,
  chronic **301**.
Metrotome—various forms 241.
  Sir Jas. Simpson's 241
Micrococci in wounds 159.
Microscope—in carcinoma uteri 439.
  endometritis 286.
  sarcoma uteri 473.
Micturition 560.
  difficult, in advanced extra-uterine gestation 553.
    in fibroid tumour 387.
      hæmatocele 168.
      prolapsus 522.
      retroflexion of gravid uterus 546.
  frequent 575.
    in cystitis 571.
    in fixation of uterus 328.
      vaginitis 492.
  painful, in carcinoma 438.
Mobility of uterus, ascertained by sound 119.
Morcellement in fibroid tumours 406.
Morgagni, columnæ and sinus of 35.
Morphia—methods of administration 155.
    in carcinoma 448
  caution as to use in dysmenorrhœa 541.
Mucoid degeneration in fibroid tumour 410.
    in sarcoma 471.
Mucous membrane of bladder 30.
    cervix 19.
    rectum 35.
    urethra 28.
    uterus 17.

- Mucous membrane of vagina 25, 488.
- Mucous polypi 412, **415**.
- Musculature of bladder 30.
  - rectum 35.
  - urethra 28.
  - uterus 17.
- Myoma uteri 373.
- Myxomatous degeneration of fibroids 381.

- NABOTHII ovula 276.
- Nabothian follicles 279.
  - pediculated 412, 417.
- Nail-curette, A. R Simpson's 398.
- Needles **134**, 190.
- Nélaton's forceps 215.
- Nervous derangements in endometritis 290, 291.
  - reflex symptoms, and lacerated cervix 265 266.
  - system, action of chloroform on 140.
- Neuralgia from pressure by fibroid tumours 387.
  - in lacerated cervix 266.
- Neuromata of vulva **510**.
- Nitrate of silver in endometritis 297.
- Nitric acid in endometritis 295, 297.
  - in carcinoma 450.

- OBTURATOR gland 67, 68.
- Oöphoritis 181.
- Opiates in dysmenorrhœa 541.
- Omental tumours and ovarian 207, 209.
  - cells found in fluid from 202.
- Os externum—contracted, 237, 239, 251, 317.
  - examination of 92.
  - position 14, 20.
- Os internum and utero-vesical fold of peritoneum 258.
- Os uteri, form in nulliparæ and multiparæ 241.
- Ovarian artery—course 64.
  - in removal of fibroids 404.
    - extirpation of uterus 460.
  - corpuscles 200.
  - fimbria 23.
  - fluid 199.
  - gestation 548, 549.
  - ligament 23.
  - plexus, of veins 67.
- Ovarian tumours—cystic **194**, **203**, **210**.
  - and extra-uterine gestation 553, 554.
  - and fibroids 393.
  - fibrocystic 411.
  - malignant **201**.
  - position of 90.
  - causing peritonitis 150.
  - solid **201**.
- Ovariotomy **211**
  - compared with laparotomy for fibroids 40.
  - normal 187.
- Ovaritis **181**.
  - and Battey's operation 189.
- Ovaries—Anatomy **22**.
  - arterial supply 64.
  - degeneration of bloodvessels 195.
  - development 69, 202.
- Ovaries—displacements **183**.
  - epithelial tubes 197.
  - examination 99.
  - inflammation **181**.
  - ligaments 22.
  - malformations 180.
  - malignant development of connective tissue 198.
  - measurements 22.
  - changes at menstrual period 81.
  - effect on menstruation 85.
  - palpation of 180.
  - position 22, 52.
    - in inversion 357.
    - in retroflexion 336.
  - prolapsed and retroflexion 342.
  - removal by abdominal section 190.
    - per vaginam 190.
  - structure 23.
  - in superinvolution 246.
  - tumours of **194**.
  - in rudimentary Uterus 226, 234.
  - in Uterus unicornis 227.
- Ovulation **80**.
  - with rudimentary uterus 226.
- Ovum—formation of membrana granulosa 202.
  - structure 24.
  - passage into uterus 81.

- PAIN—in endometritis 290, 291.
  - carcinoma uteri 437.
  - carcinoma of body of uterus 465.
  - cervical catarrh 278, 279.
  - inversion 360.
  - retention of menses in atresia 480.
  - ovaritis 182.
  - acute and chronic peritonitis 152
  - peritonitis 155.
  - prolapsed ovary 184.
  - retroflexion 337, 338.
  - sarcoma uteri 471.
- Palpation, method of 89.
- Pampiniform plexus 67.
  - in extirpation of uterus 461.
- Parametric tissue 43.
- Parametritis 157.
  - chronica atrophicans 158.
  - posterior, of Schultze 157.
- Paravesical pouch of peritoneum 52.
- Parenchymatous inflammation 301.
- Parovarium 21.
  - development 70.
  - distension 178.
- Parovarian fluids, nature of 201.
  - tumours and ovarian 208.
- Parturition, repeated, and carcinoma 434.
  - endometritis 289.
  - ovaritis 181.
- Péan's method of laparotomy for fibroids 406.
  - needle for pedicle 405.
- Pedicle—changes in, after ligature 217.
  - treatment in fibroid tumours 403.
    - extra- and intra-peritoneal methods compared 404.

Pedicle of Ovarian tumour 198.
examination 207.
torsion 220.
treatment in ovariotomy 216.
Pedunculation of fibroid tumours 379.
Pelveo-peritonitis 149.
Pelvic abscess 158, 160.
bursting of 161.
Pelvic cellulitis **157**.
Pelvic connective tissue **40**.
Pelvic Floor—general anatomy **7**.
structural anatomy **55**.
displacements 58, **521**.
preventing downward displacement 312.
affected by genupectoral posture 72.
intra-abdominal pressure on 59, 71.
loose tissue 521.
measurements on external surface 6.
muscles 8.
opening up of, in genupectoral posture 58.
in parturition 58.
relation to parturition 55, 72.
Pelvic Floor projection **60**.
callipers for measuring 62.
measurements 60.
effect of pregnancy on 63.
Pelvic Floor segments 56.
contrast between 56.
as affected by genupectoral posture 74.
in parturition 56.
Pelvic glands 67.
Pelvic inflammation producing displacement 313, 314.
after stem pessary 249.
and subinvolution 304, 305.
Pelvic Peritonitis **148**.
producing anteflexion 318.
with anteversion 329.
producing small uterus 246.
Pelvis—bloodvessels of 64.
coronal sections 43.
section in genupectoral posture 76.
horizontal sections 42.
lateral sagittal section 41.
lymphatics 67.
nervous supply 69.
venous plexuses 65.
Perchloride of iron to check hæmorrhage 447.
caution as to use 447.
Percussion, method of 91.
ovarian tumour and ascites 206.
Perforation into peritoneal cavity in carcinoma 430, 431, 443.
Perimetritis 149.
Perineal Body **36**, 10.
structure 37.
measurements 37.
Perineal muscles 9.
Perineum—arterial supply 65.
Perineum—development 503.
rupture 512.
central rupture 513, 514.
operative treatment 515, 529.
support in parturition 515.
Periovaritis 183.
Peritoneum—anatomy of **37**.
of bladder 37, 59, 39.
in parturition 57.
of broad ligaments 38.
in carcinoma 430.
amputation of cervix 260.
prolapsus 522.
fistula 579.
inversion 357, 358.
method of opening into 191.
in relation to operations 39.
in parturition 39
on sides of Pelvis 39.
local divisions on pelvic floor 51.
and rectum 39.
in retroflexion, 336.
of uterus 38, 17.
on posterior vaginal wall 38.
vesico-uterine pouch of 37.
Peritonitis—pelvic **148**.
and carcinoma 443.
relation to cellulitis 149.
malignant, cells found in fluid from 202.
after uterine injections 176.
producing retroversion 332, 333.
Pessary—intra-uterine 324.
in retroflexion 354.
Vaginal—Albert Smith 347, 349, 352.
anteflexion 327.
anteversion 330.
in chronic metritis 307.
effect on position of uterus 78.
in fibroid tumour 397.
Hodge 347, 348, 352.
mode of Introduction 349, 350.
medicated, composition of 493.
in pregnancy 354.
(Mundé's) for prolapsed ovaries 185.
ring 526.
Zwanck's 527.
Pflüger's ducts, a source of ovarian tumours 195.
Phthisis—amenorrhœa in 536.
uterus in 245.
Physics of abdomen and pelvis **71**.
Piles 604.
Placenta—in extra-uterine gestation 551.
growth, after death of the fœtus 555, 556.
treatment 555.
portions retained, and carcinoma 441, 442, 446.
relation to inversion 355, 356, 360.
Placental polypi 412, **417**.
Polypes à apparitions intermittentes 415.
Polypi of uterus **412**.
and endometritis 289.
fibrous 412.

Polypi—producing Fallopian-tube gestation 418, 552.
  diagnosis from Inversion 363.
  producing Inversion 355, 356, 360.
  +Inversion, diagnosis of 364.
  mucous 412, **415**.
  mucous and fibrous contrasted 418.
  placental 412, **417**.
Polyptome, Sir J. Y. Simpson's 424.
Porte-caustique 297.
Posterior fornix, effect of pressure on 353.
Posture—relation to examination and treatment 78.
  of patient in cellulitis and peritonitis 160.
Pouch of Douglas 38, 52.
  intestines in 54.
Pregnancy—advanced, and fibroid tumour 393.
  early, diagnosis 307.
   from fibroid tumour 390, 392.
   characters of uterus 306.
  diagnosis from chronic metritis 307.
   ovarian tumour 207.
  uterus dilated from atresia 481.
  fissuring of cervix in 265.
  course in an extra-uterine gestation 552.
  complicated by large fibroid tumours 391.
  +ovarian tumour 209, 221.
  hypertrophy of cervical glands in 277.
  and syphilis **614**.
  anteversion of uterus in 328.
  sympathetic phenomena of, in uterine polypus 418.
Prognosis in gynecological cases 623.
Presentation of head and lacerated cervix 263.
Prolapse of ovary **184**.
Prolapsus uteri 72, **521**.
  due to fibroid 383.
  + Inversion 363, 364.
  mechanism 522.
  retroversion in 332.
Pruritus Vulvæ **506**.
  in carcinoma 438.
Pseudocyesis and ovarian tumour 207, 209.
Puberty—changes at 80.
  symptoms of atresia at 479.
Pubic segment—of Pelvic Floor 56.
  displacements 59.
  in bimanual examination 94, 97.
  in semi-prone posture 108.
Puerperal inflammation 299.
  inversion, frequency of 359.
Puerperium—rapid development of carcinoma in 441, 442, 466.
  and endometritis 293.
   inversion 355, 359.
   peritonitis 150.
   retroflexion 337.
   retroversion 332.
   subinvolution 305.
Pulse—in hæmatocele 168.
   peritonitis 153.
Pyosalpinx 177.

Rake for removing sutures 257.
Rectal examination **98**.
  in atresia 480.
   carcinoma 440.
   hypertrophied cervix 252.
   inversion 361.
   pathological anteflexion 321.
   retroflexion 340
   superinvolution 248
   uterine malformations 232.
  Simon's method 100.
Recto-abdominal examination 97, 98, 99.
Rectocele 602.
  and prolapsus 524.
Recto-vaginal fistula 605.
Recto-vagino-abdominal examination 97.
Rectum—anatomy **34**.
  diseases of **601**.
  examination **601**.
  pressure on, by fibroid tumour 387.
  lymphatics of 69.
  physiology **600**.
  position 34.
  in retroflexion 336.
  structure 35.
  ulceration in carcinoma 429.
  displacing Uterus 311.
  connection with the Vagina 35, 58.
Reflex action and chloroform 140, 143.
Reinversion of stump of amputated uterus 372.
Renal calculi 573.
  tumours and ovarian 207, 209.
Respiratory centre in chloroform 140.
Retention of urine **575**.
  producing cystitis 546, 571.
  due to fibroid tumour 387.
   extra-uterine gestation-sac 555.
   retroflexed gravid uterus 546.
Retroflexion 312, 313, 314, **334**.
  and cervical catarrh 278.
  congenital 335, 336.
  and small fibroid tumour 391.
  relation to retroversion 333.
  of gravid uterus 339, **545**.
  and extra-uterine gestation 551, 553.
Retro-pubic fat deposit 40, 56.
Retro-uterine hæmatocele 163.
Retroversion 313, 314, **332**, **334**.
  passage of sound in 116.
  caused by peritonitis 157.
  action of pessary on 352, 354.
  physiological and pathological 312, 332.
  in prolapsus 523.
Retroversion + Retroflexion 313, 314, **334**.

Rheumatic diathesis and dysmenorrhœa 542.
Ring pessary 526.
  with diaphragm 526.
  mode of introduction 526.
  position in vagina 527.
Rosenmüller, organ of 21.
Round Ligament—anatomy of 17.
  hydrocele **178**.
  a guide to parts of uterus 227.

SACRAL SEGMENT of Pelvic Floor 56.
  rupture of inferior angle 513.
  the supporting one 59, 512, 524.
  supporting pessary 353.
Salpingitis 176.
Sarcoma of ovary, cells found in fluid from 202.
  of uterus **467**.
    and carcinoma 441, 442.
      endometritis 293.
      Inversion 360.
  of vagina **499**.
Sarcomatous degeneration in polypus 416.
Scarification of cervix 283.
Schrœder's operation for cervical catarrh 268, 283, 284.
Schultze's dilator 240.
Scirrhous cancer 425.
Scissors 133.
  Bozeman's 133.
  for division of cervix 242.
  Hart's 133, 327.
  Kuchenmeister's 133.
Scrofula, leucorrhœa in 289.
Semiprone posture 78, 107.
Septic matter causing cellulitis 158.
Septicœmia—after amputation 372.
  after operation for atresia 483.
  in carcinoma 443, 444.
  from suppuration of fibroid tumours 389.
  in laparotomy for fibroids 403.
  in inversion of uterus 365.
  relation of lymphatics to 68.
  and metritis 301.
  after ovariotomy 220.
  after tents 128.
Septic peritonitis 150, 155.
Serre-nœud of Cintrat 403, 406.
  in laparotomy for fibroids 404, 406.
Serous peritonitis 152, 156.
Serum, collection in Fallopian tubes 177.
Sexual excess and endometritis 289.
Sickness after chloroform 143.
Silk-worm gut 135.
Silver-wire sutures 135.
Simon and Marckwald's amputation of cervix 253.
Simon's sharp spoon 451.
Simpson's (A. R.) amputation of cervix 254.
  nail-curette 398.
  sound 114.
  modification of Thomas' curette 131.
Simpson's (A. R.) volsella 101.
Simpson's (Sir J. Y.) division of cervix 241, 325.
  galvanic intra-uterine stem 248, 324.
  metrotome 240.
  sound 113.
  volsella for fibroids 400.
Sims' (Marion) division of cervix 325, 326.
  amputation of cervix 253.
  dilator 240.
  enucleator 399.
  speculum 108, 280.
  operation for vaginismus 495.
Skene-Goodman catheter 572.
Smith (Albert) pessary 347, 349.
  mode of action 352.
Souffle—uterine, in fibroid tumour 392.
  absence of, in ovarian tumour 206.
Sound—uterine **113**.
  combined with Bimanual 121.
  in anteflexion 322.
    hypertrophied cervix 252.
    endometritis 292.
    small fibroid tumours 390.
    pediculated submucous fibroid 419.
    inversion 363.
    polypus and inversion 421.
    polypoidal fibroid 393, 419.
    chronic metritis 306.
    retroflexion 340.
    superinvolution 248.
    uterine displacements 315.
  method of dressing 282, 295.
  in replacing retroflexion 340.
  in treating anteflexion 324.
Spray in ovariotomy 220.
Specula, Vaginal—comparative advantages of various forms 112.
  Barnes' crescent 111.
  Battey's 107, 108.
  Bozeman's 106.
  Cusco's 112.
  Fergusson's **109**.
  Neugebauer's **110**.
  Sims' **106**.
Speculum—anal 601.
  intra-uterine 297.
  urethral and vesical 564, 565.
Spencer Wells' clamp 216.
  trocar 215.
Sphincter Ani—externus 35.
  internus 35.
  tertius 35.
  operation to restore 517.
Sponge tents 123.
  in abortion 545.
Stem—galvanic intrauterine 248.
  in anteflexion 323.
Sterility **543**.
  in anteflexion 319, 320.
    cellulitis 158.
    cervical catarrh 278, 279.
    hypertrophied cervix 251
    stenosis of cervix 238.
    dyspareunia 494.

Sterility—in endometritis 290, 291.
  stricture of Fallopian tubes 175.
  fibroid tumour 383, 388.
  fistula 581.
  chronic metritis 306.
  peritonitis 153.
  double ovaritis 182.
  uterine polypi 417, 418.
  retroflexion 338.
Strumous diathesis and endometritis 293.
Subinvolution 299, **302.**
  and lacerated cervix 264.
  with retroflexion 335.
Superfœtation 232.
Superinvolution **246.**
  due to ovaritis 181.
Supra-vaginal portion of cervix, hypertrophy of 250, 257, 258.
Supra-vaginal amputation of the cervix 456.
Suppuration after cellulitis 162.
  hæmatocele 171.
Sutures 135.
  removal of 257.
Sympathetic pain in ovaritis 182.
Syringe, Higginson's 137.
Syphilis **607.**
  producing abortion 544.
  ulceration of perineum 514.
Syphilitic ulceration and carcinoma 441.

TAIT'S graduated dilators 422.
Tangle and tupelo tents 124, 127.
Tapping in cellulitis 162.
  hydrocele 178.
  ovarian tumours 210.
  peritonitis 156.
Temperature, reduction of 156.
Tenaculum—Sims' 105.
  in diagnosing lacerated cervix 267.
Tents 123.
  dangers of 240.
  in stenosis of cervix 240.
Thomas' anteversion pessary 331.
  cervical plug 244.
  clamp for pedicle of fibroid tumours 405.
  spoon-saw 399.
Torsion for removal of polypi 423.
Trachelorrhaphy 268.
Treatment—operative, in Gynecology **623.**
  sound in 120.
  specula in 105.
  volsella in 105.
Triangular ligament 10.
Trigone of bladder 30, 32.
Trocars for tapping ovarian cysts 215.
Tubal gestation **548.**
Tubo-ovarian cysts 179.
  gestation 549.
Tubercular diathesis in superinvolution 246.
Tumours, pelvic, and chronic metritis 305.
Type of menstruation 80.

ULCERATION of Cervix—so-called 266, 273.
  true 276.
Upright posture 5, 73, 74.
Uræmia in carcinoma 443.
Uræmia in fibroid tumour 388.
Ureter—anatomy of 31, 52.
  catheterisation 566.
  relation to cervix and urethra 579
  dilatation in carcinoma 429.
  dilatation due to cicatrisation 336.
  compression by fibroid tumours 387.
  relation to gastro-elytrotomy 31.
  opening of 30.
Uretero-uterine fistula 577, 580, 582.
Uretero-vaginal fistula 578, 580, 582.
Urethra—anatomy of **27.**
  atresia in fistula 579, 593.
  caruncle 567.
  development 503.
  dilatation 567.
  direction 27.
  exploration 562.
  glands 29.
  malformations 567.
  neoplasms **567.**
  pressure on, by fibroid tumour 387.
  relation to vaginal wall 57.
Urethral orifice 4.
Urethritis **568.**
Urethro-vaginal fistula 577, 581.
  + atresia of urethra 593.
Urination, physiology of 560.
Urine—normal Composition 561.
  character in cystitis 571.
  incontinence and retention **575.**
  ,, in fistula 581.
Uro-genital sinus 502.
  persistence of 503.
Utero-sacral Ligaments—anatomy of 17.
  cicatricial contraction in 157, 318.
  function compared with pessary 337, 352.
  stretching of, in retroflexion 337.
Uterine artery—course 65.
  in extirpation of uterus 460.
  removal of fibroids 404.
Uterine cavity—variations in length of 119.
  contractions—importance in diagnosis 208, 393.
  disease—etiology of **619.**
  mucous membrane in long-standing endometritis 288.
    changes in, at menstrual period 80.
  plexus of veins 66.
Uterus—absent, or rudimentary 226, 227, 231, 232, 233.
  amputation at os internum 403.
  anatomy **14.**
  anteflexion 312, 314, **315.**
  anteversion 313, 314, **328.**
  atrophy **245.**
  arterial supply 65.
  Bicornis 228, 231, 232, 234.
  carcinoma **425**, **436**, **446**, **464.**
  changes after birth 231.
  congenital atrophy 230, 231, 235.
  curetting 132.
  development 69.
  Didelphys 228, 231, 234.
  dilatation in atresia 476.

- Uterus—dilatation and perforation in carcinoma 443.
  - displacement 311.
    - in extra-uterine gestation 553, 556.
    - large fibrous polypi 413.
    - hæmatocele 164, 169.
    - ovarian and uterine tumours 411.
    - peritonitis and cellulitis 157.
  - enlargement of, in endometritis 292.
  - extirpation of, through abdominal walls 459.
    - through the vagina 462.
  - changes in extra-uterine gestation 551, 552.
  - evacuation after abortion 545.
  - effect of digital pressure in fornices 77.
  - fibroid tumour **373**, **385**, **395**.
  - changes with fibroid tumour 379.
  - fibro-cystic tumours **409**.
  - changes in, at angle of flexion 317 335.
  - glands 18.
  - hypertrophy 250.
    - in prolapsus 522, 523.
  - infantile 229, 231, 235.
  - inflammation (endometritis, metritis) **285**, **299**.
  - inversion **355**.
    - spontaneous reinversion 364.
  - lateri-version 313.
  - ligaments 17.
  - lymphatics 68.
  - malformations **225**.
  - massage 310.
  - measurements 15.
  - mobility 52, 101.
    - range 54.
  - changes in at Menstrual period 81.
  - periods at which Morbid conditions arise in 223.
  - mucous membrane 17.
  - musculature 17.
  - nervous supply 69.
  - peritoneum of 17.
  - polypi **412**.
  - position, means of ascertaining 49.
    - with distended bladder 49.
    - normal 48.
    - physiological changes in 52, 312.
    - relation to viscera **46**.
  - prolapse **521**.
  - retroflexion 312, 314 **334**.
  - retroflexion of gravid **339**.
  - retroversion 313, 314, **332**, **334**.
  - sarcoma **467**.
  - septus 229, 231, 232, 235.
    - atresia of 487.
  - shape 13.
  - form in section 16.
  - structure 16.
  - subinvolution **302**, 304, 305.
  - superinvolution **246**.
  - support of 59.
  - Unicornis 226, 231, 332, 234.
- VAGINA—anatomy **24**.
  - arterial supply 65.
  - atresia **476**.
  - cancer of, primary **498**.
    - secondary 431.
  - cicatrisation after fistula 579.
    - after labour 479.
  - artificial closure for fistula 596.
  - congenital bands in 488.
  - cysts **496**.
  - development 69.
  - dilatation in atresia 477.
  - direction in upright posture 24.
  - fibroid tumours **497**.
  - form in section 27.
  - in genupectoral posture 75.
  - inflammation of **489**.
  - lymphatics 68.
  - change after menopause 491.
  - plugging to check hæmorrhage 447.
  - sarcoma **499**.
  - structure of **26**.
  - relation of walls 55.
- Vaginal cleft 56.
  - columns 25.
- Vaginal examination **91**.
  - glands 26.
  - glass-plugs, 485.
- Vaginal Orifice—anatomy 4.
  - dilatation of 495.
  - division of sphincter 495.
  - fissures around, producing vaginismus 494.
- Vaginal portion of cervix, hypertrophy of 250, 258.
- Vaginal walls—connection of 57.
  - inversion in prolapsus 522.
  - length 25.
- Vaginismus **494**.
- Vaginitis **489**.
  - diphtheritic 489, 491.
  - gonorrhœal 489, 491, 492.
  - senile 489, 491.
- Varicose veins, due to fibroid tumours 387.
- Varix of vulva 511.
- Veins, pelvic—compressed by fibroid tumours 387.
  - rupture of 156.
- Venereal excess, causing peritonitis 151.
- Venous sinuses round fibroid tumours 375, 386.
- Venous thrombosis in carcinoma 443, 445.
- Versions of uterus 312, 313.
- Vesico-uterine fistula 577, 580, 582, 593.
- Vesico-vaginal fistula 429, 431, **577**.
  - artificial, for cystitis 572.
- Vesico-vaginal septum 577.
- Vesico-vagino-abdominal examination 97
- Vestibule—Anatomy 4.
  - development of 503.
- Vichy waters in chronic metritis 308.
- Volsella—description **101**.
  - examination with 100.
  - Hart's 103.
  - A. R. Simpson's 102.
  - Sir J. Y. Simpson's, for fibroids 400.

Volsella—with speculum 108.
  in superinvolution 248.
  for introducing tents 126.
  in replacing uterus 346.
Vomiting in hæmatocele 168.
  peritonitis and cellulitis 161.
Vulva—atresia of 503.
  carcinoma **510.**
  cysts 508.
  elephantiasis 509.
  fibromata **510.**
  hæmatoma 511.
  hæmorrhage from varicose veins 511.
  inflammation **505.**
  lipomata **510.**
  malformations 502.
  neuromata **510.**
  pruritus of **506.**
  varix 511.
Vulvitis **505.**
  of children 506.

Water injections, into connective tissue 44.
Weir Mitchell's treatment of chronic uterine disease 157, 309.
White's repositor for Inversion 367.
Wiesbaden waters in chronic metritis 308.
Wire sutures in amputation of cervix 255.
Wolffian bodies 69.

Zona pellucida 24.
Zwanck's pessary for prolapsus 526.

EDINBURGH: PRINTED BY TURNBULL AND SPEARS.

8vo, cloth, Illustrated, price 15s.

CONTRIBUTIONS TO OBSTETRICS AND GYNECOLOGY.

By ALEXANDER R. SIMPSON, M.D.,

PROFESSOR OF MIDWIFERY AND THE DISEASES OF WOMEN AND CHILDREN IN THE UNIVERSITY OF EDINBURGH.

EDINBURGH: ADAM & CHARLES BLACK.

Large Folio, price 25s.

THE RELATIONS OF THE ABDOMINAL AND PELVIC ORGANS IN THE FEMALE.

ILLUSTRATED BY A FULL-SIZED CHROMO-LITHOGRAPH OF THE SECTION OF A CADAVER FROZEN IN THE GENU-PECTORAL POSITION, AND BY A SERIES OF WOODCUTS

By ALEXANDER R. SIMPSON, M.D.,

PROFESSOR OF MIDWIFERY AND THE DISEASES OF WOMEN AND CHILDREN IN THE UNIVERSITY OF EDINBURGH.

AND

DAVID BERRY HART, M.D., F.R.C.P.E.

LECTURER ON MIDWIFERY AND THE DISEASES OF WOMEN, EDINBURGH.

EDINBURGH AND LONDON: W. & A. K. JOHNSTON.

Large Quarto, price 10s. 6d.

THE STRUCTURAL ANATOMY OF THE FEMALE PELVIC FLOOR.

By DAVID BERRY HART, M.D., F.R.C.P.E.

LECTURER ON MIDWIFERY AND THE DISEASES OF WOMEN, EDINBURGH.

EDINBURGH; MACLACHLAN & STEWART.